The Only Journal With a Paid Circulation in the Rock Products Industry

Rock Products

Entered as second-class matter, July 2, 1907, at the Chicago, Illinois, Postoffice, under the Act of March 3, 1879.

Published Every Other Saturday by

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Guiding Your Business on Facts

Freight rates and the supply of freight cars have always been important, even vital factors, in the life and success of industries producing the heavy basic commodity of the rock products industry. Even plants on waterways or within trucking distance of their markets depend to a degree on rail transportation and it is usually this increment of business which determines a season's profit or loss.

In 1920 and again during the present year, the rail situation has been so serious as to greatly affect the profit of all operators. But those who have kept closely in touch with each changing phase of the situation have been able to guide more intelligently their action and have suffered less than those who found it seemingly difficult or impossible to closely watch the situation.

Those operators who read ROCK PRODUCTS carefully have been promptly, accurately, and completely informed of each new change and its effect on the car supply. Neither money nor effort has been spared to get all the facts, and to get them in time to be of real value to those who depended on the information.

When a special hearing was held before the Interstate Commerce Commission a month ago, an editorial representative of ROCK PRODUCTS attended the hearing. His telegraphic report of the important points appeared in the issue of ROCK PRODUCTS published two days later. More details of interest appear in the current issue.

Only by following carefully such complete and up-to-the-minute reports on these vital conditions can an operator best size up the situation, and act to greatest advantage under the conditions existing. ROCK PRODUCTS has in the past, does at present, and will continue in the future to follow the policy of publishing all the important news of the industry, giving the best possible service in presenting the news to those busy men in the industry who depend on it to guide their action especially in times of disturbed and abnormal conditions.

* * *

Practical Help in Running a Plant

While current news of conditions in the industry is vitally important to the operator in guiding his business, and while the current news published in ROCK PRODUCTS forms an exceedingly valuable part of the service the magazine renders, the news section is neither the largest nor the most important section from most points of view. Authoritative articles on better operating methods form the backbone of ROCK PRODUCTS, and it is these articles which make the magazine invaluable to the thousands of operators who read it regularly and who "swear by it."

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Two important series start with this issue, for example, and will continue for several issues. One will discuss screens from A to Z, and its author, Edmund Shaw, is well known to ROCK PRODUCTS readers as a man who has visited hundreds of plants and made a thorough study of all types of screening equipment. Another series by the well-known authority, Oliver Bowles, is chuck full of practical hints for cutting production cost. A good many individual articles on modern plants and their operation, all well illustrated with photographs and diagrams, are prepared and waiting for space to be published.

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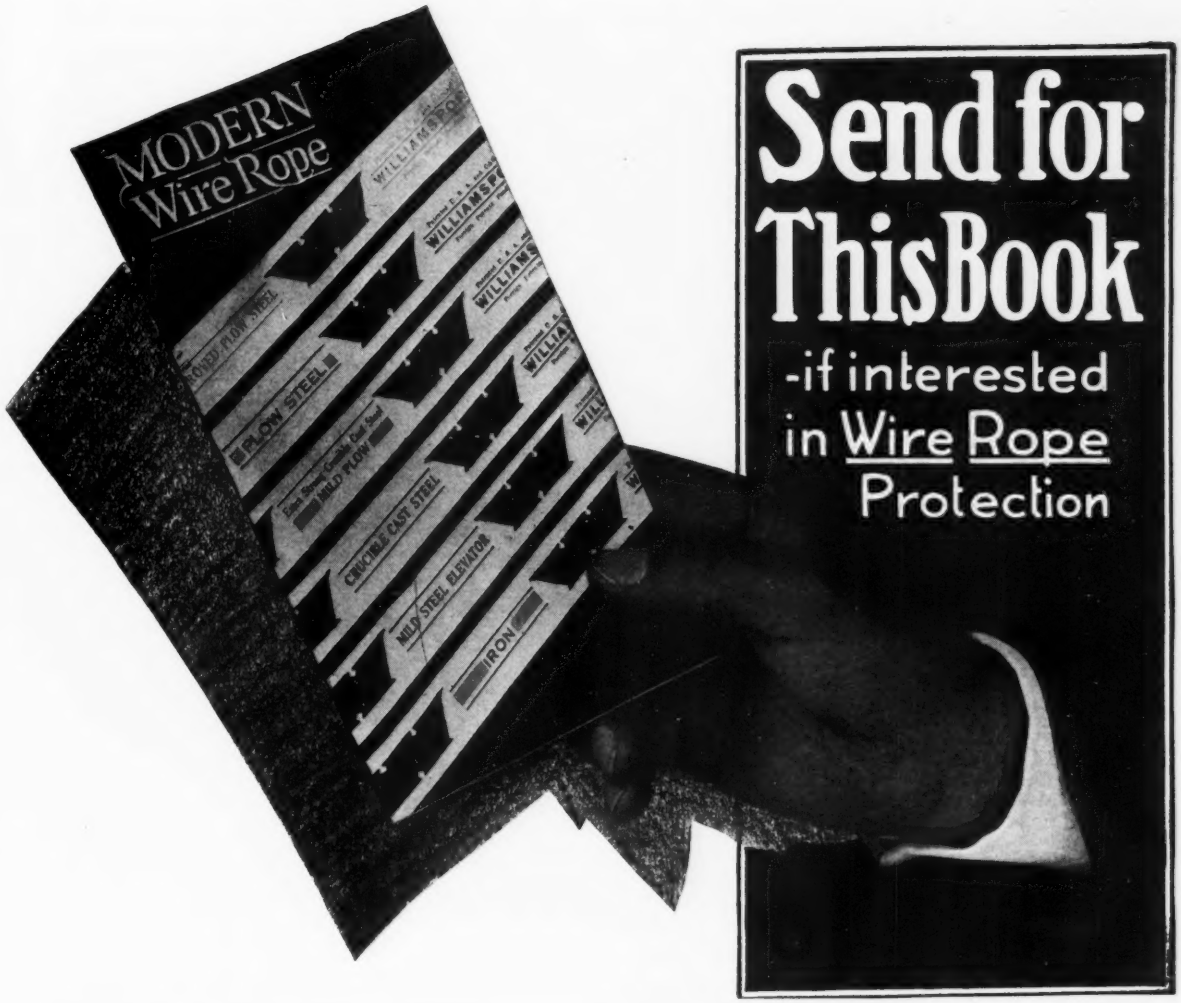

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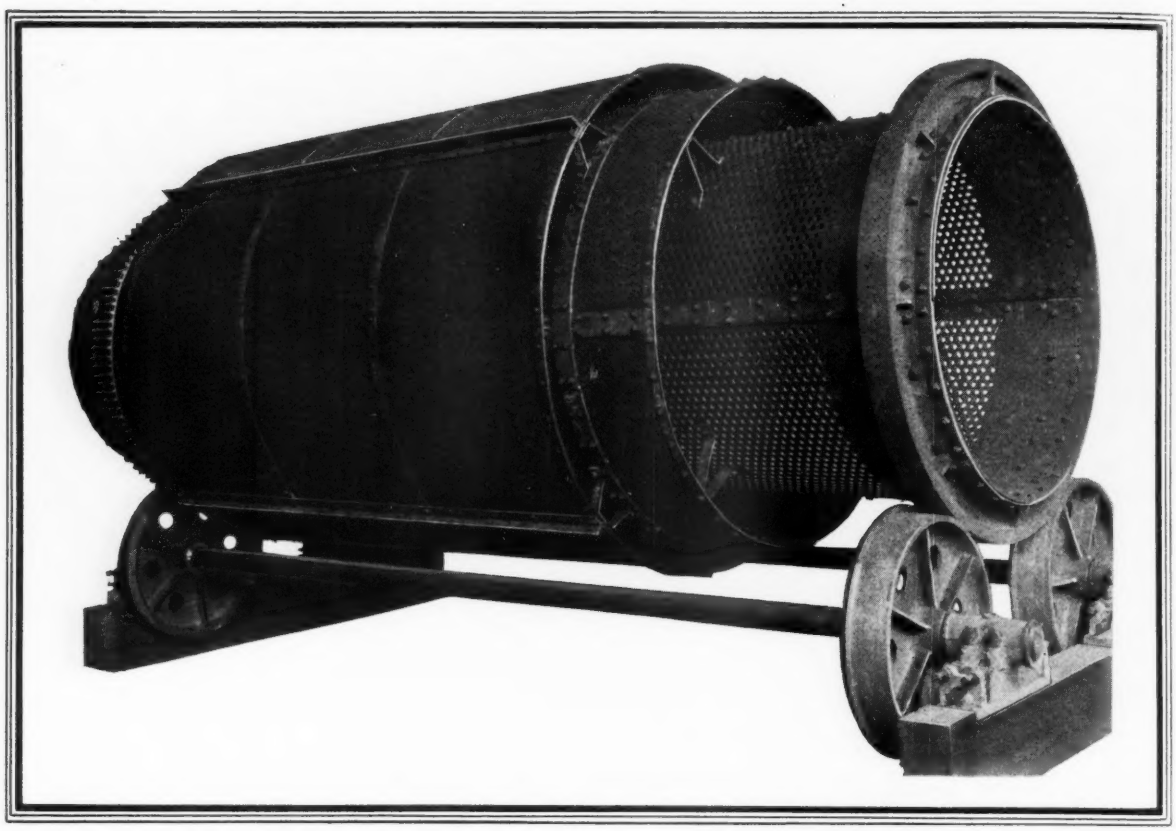

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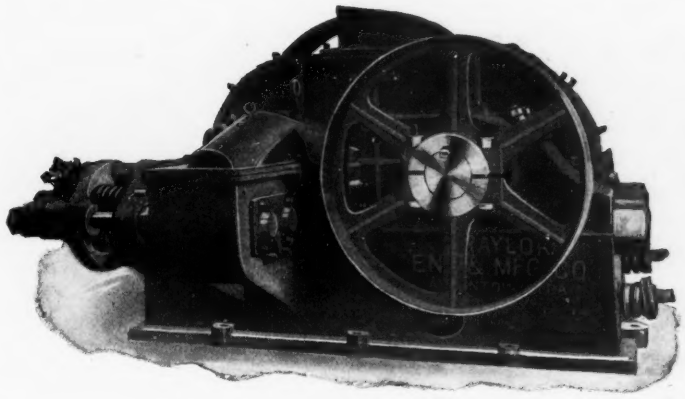

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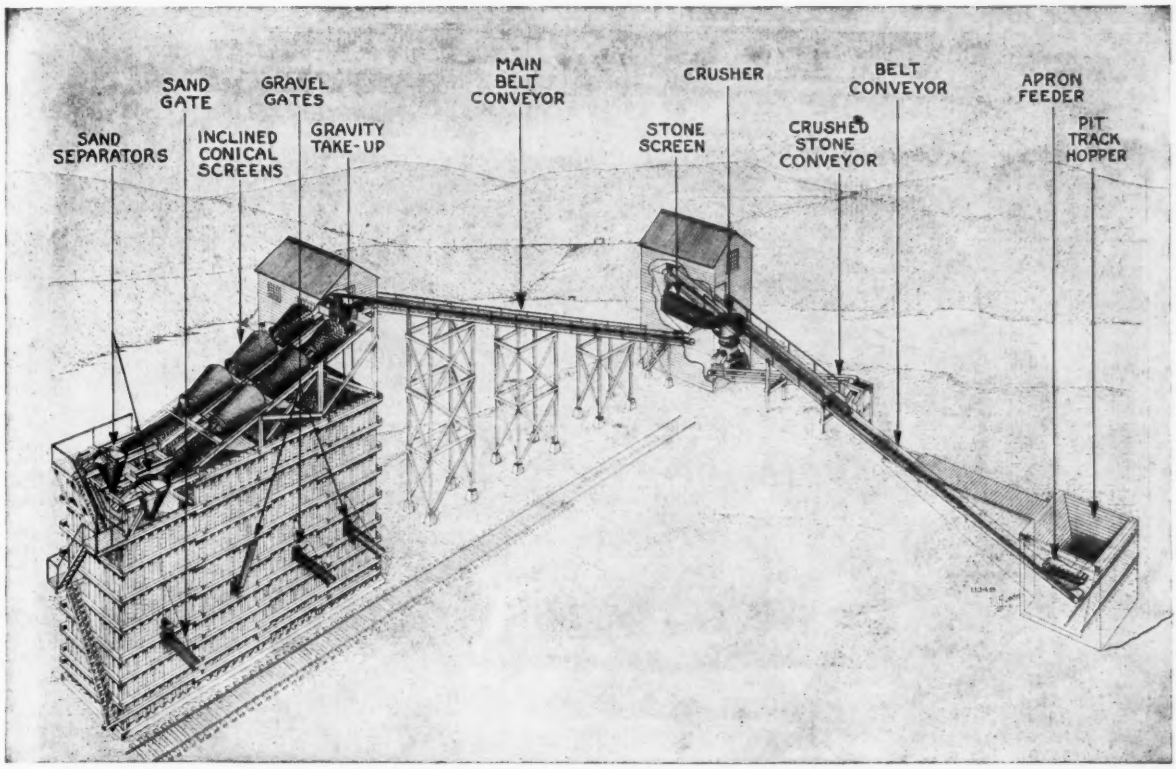

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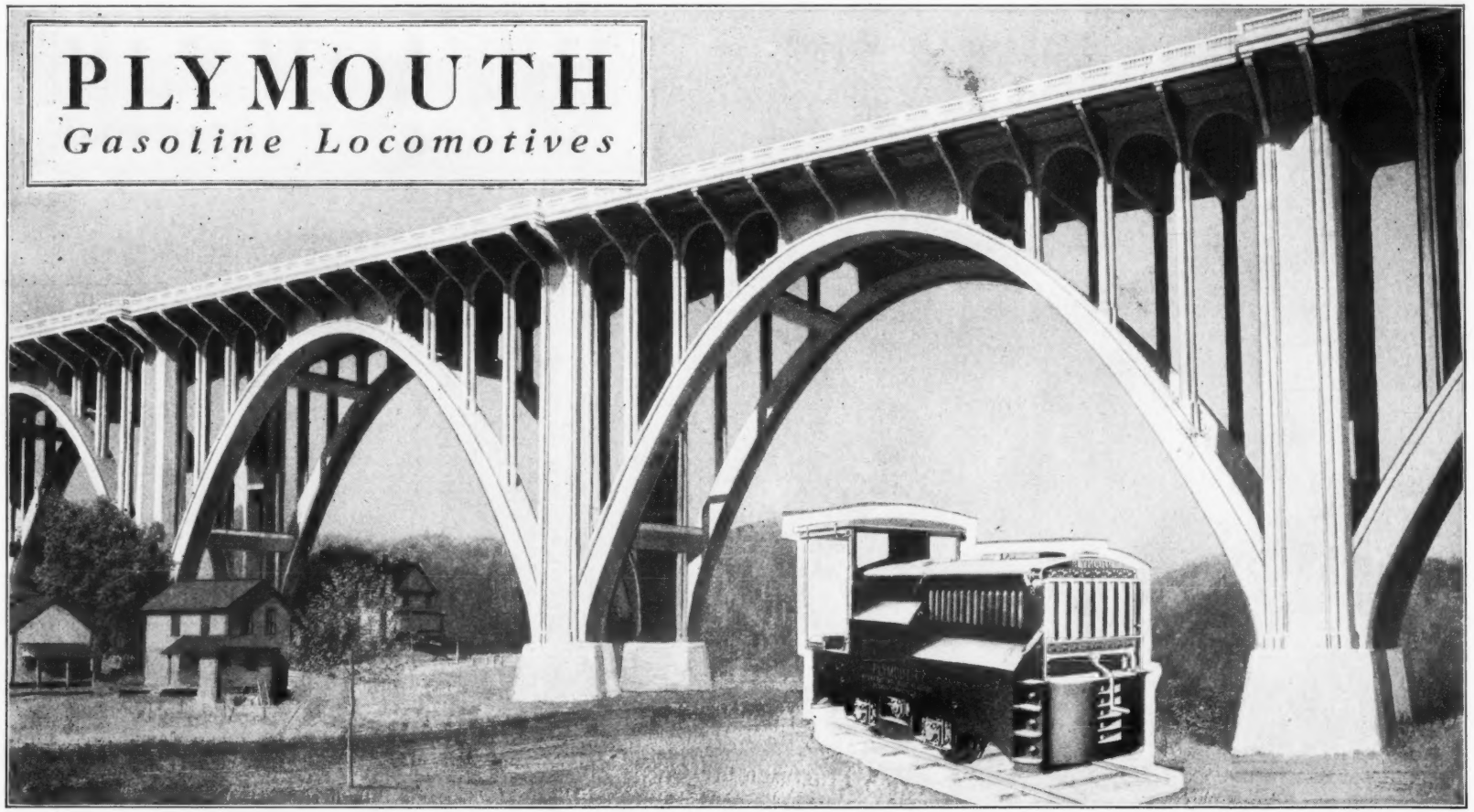


North Hill Viaduct, Akron, Ohio, Constructed by James O. Heyworth, Engineer and General Contractor. For Magnitude See Data Below

James O. Heyworth, Engineer and Contractor, Chicago, completed in August the above viaduct, of which the following data indicates its magnitude:

Data—North Hill Viaduct, Akron, Ohio. Work begun June, 1919. Completed August, 1922. Total length, 2810 feet. Maximum height, 135 feet. Number of spans, 16. Two concrete approaches, north 148 feet, south 167 feet. Arch spans vary, 116 feet to 191 feet. Concrete used, 57,000 cu. yds. Reinforcing bars, 2,500 tons. Width of deck, 72 feet. Ten foot sidewalk each side. Roadway between curbs, 52 feet. Double track in center for street railway traffic.

Mr. Heyworth writes: "All concrete in job, except small amount going direct into forms, was handled from mixing plant to structure by three 3-ton PLYMOUTH Locomotives. Service given was very satisfactory."

That's glory enough. Ask us for literature

THE FATE-ROOT-HEATH CO., PLYMOUTH, OHIO

Rock Products

Volume XXV | Chicago, October 21, 1922 | Number 21

Pueblo's New Crushed Rock Plant

By Austin G. Marsh, M. E., Pueblo, Colo.

Formerly in the contracting business, Mr. Orman and Mr. Vedder have recently entered the crushed stone field, equipped with a most modern and efficient plant. In this article Mr. Marsh has given the plant a description rich in detail

THE Orman Crushed Rock Co. has recently entered the field as a producer of crushed rock and sand. It is within the city limits of Pueblo, Colo., at the eastern edge of town, on the main line of the Santa Fe Railroad, and near the junction of the Arkansas and Fountain rivers.

The deposit consists of a strata of alluvial sand and gravel approximately 22 ft. thick overlying a shale hill, practically horizontal, of uniform thickness and its surface is about 65 ft. higher than the railroad track which skirts the bottom of the hill. The property consists of about 22 acres, 20 of which are covered with gravel; it is estimated that about 600,000 cu. yd. of material are available.

A familiar formation in this locality are all of the hills in the broad river valley in the vicinity carrying a similar gravel strata deposited there during the shifting of the river channels as they gradually eroded to their present depth. Practically all of this gravel, however, except the deposit in question, is either too shallow or too isolated by deep gulleys and arroyas to be worked economically.

There is about 40 per cent of sand in this deposit (minus ¼ in.) and 60 per cent rounded gravel, pebbles and boulders. The maximum size of the latter is about 8 in. in diameter, with an occasional one much larger—sometimes even 18 in. in diameter.

The pebbles and boulders are chiefly granite, and though a great variety of other igneous rocks are represented, quartz, trachyte, syenite, diabase, etc. When washed the sand consists almost entirely of quartz and feldspar, the former slightly predominating.

Practically, there is no overburden on this deposit. The surface for about 18 in. contains some silt, but this is taken care of in the washing process in the plant, no provision is made for stripping.

Fig. 1—This is the plant of the Orman Crushed Rock Co. At the right are the grizzly and the crusher house. In the center are the screening and washing plant and the storage bins. At the left is the pea gravel storage pile

Fig. 2—A partial view of the pit looking east from the crusher house

Fig. 3 shows the flow sheet of the plant, the various steps involved being herewith described.

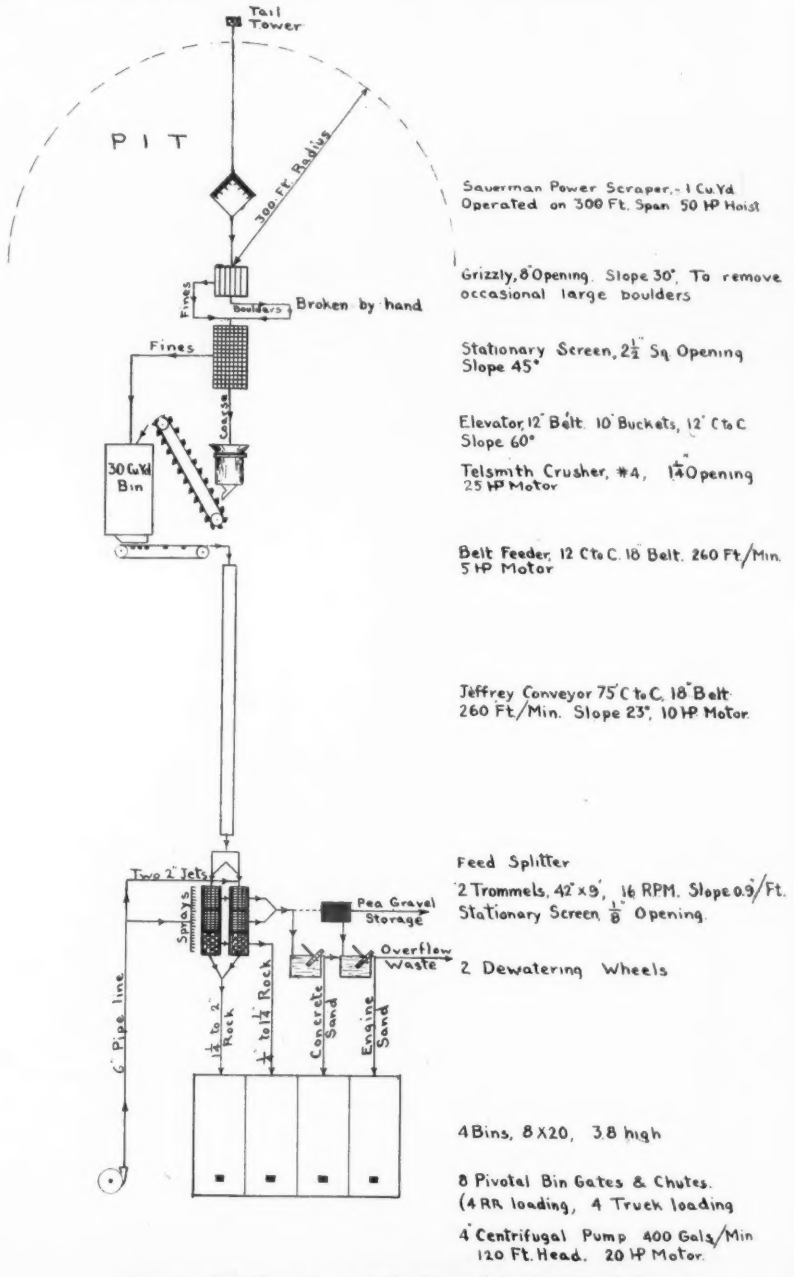
The raw material is brought to the crushing plant by means of a Sauerman 1-yd. power scraper, having an operating span of 300 ft. and using a Le Claire type scraper, provided with six manganese steel teeth. The gravel in the deposit is rather firmly packed but is not cemented and is therefore easily excavated. The scraper moves up a slight incline in order to discharge over the grizzly. Power is supplied through a 50-hp. Clyde hoist, motor driven, which pulls the scraper forward at 200 ft. per minute and backward at 600 ft. The capacity of this outfit is 300 cu. yd. per 8 hr. At present, however, working on a comparatively short radius, over 350 cu. yd. per 8 hr. is being excavated. The hoist is placed near the crusher bin, on a concrete foundation, at the level of the shale-gravel contact. Fig. 4 shows the loaded scraper emerging from the pit just before reaching the discharge point; the tail tower is seen in the background. Fig. 2 shows the scraper at the moment of discharge over the grizzly; the hoist house at the right and the conveyor, trommels and upper parts of the bins at the left.

At the edge of the gravel strata is the crushing plant, on top of the hill, the bin foundation piers being 13½ ft. below the shale-gravel contact. The material brought in by the scraper is discharged to a stationary steel square mesh screen with 2½ in. opening and is sloped to 45 deg.

In order to prevent occasional boulders from getting to the crusher a grizzly is provided composed of 2-in. pipe with their ends inserted in the screen openings about at the middle of the screen and extending downward on a 30-deg. slope to a sledging floor where the boulders are broken by hand and dropped into the crusher feed chute.

All oversize of the stationary screen passes by chute to a No. 4 Telsmith crusher, set at 1¼-in. opening, while the fines fall directly into a 30-cu. yd. bin. The crushed rock discharges from the crusher to a short belt and bucket elevator, which carries it up and discharges into the same bin with the fines. The elevator is driven from the crusher shaft through countershaft and chain drive. A 25-hp. Lincoln motor drives the crusher and elevator.

Fines and crushed rock are fed automatically through a bottom bin gate, whose opening may be regulated by a hand wheel to an 18-in. belt feeder operated by an independent 5-hp. motor. All the material is discharged from the feeder to the main conveyor with an 18-in. belt, 75 ft. center to center, 23 deg. slope. This conveyor, also independently driven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PIT
300 Ft. Radius
Sauerman Power Scraper, 1 Cu. Yd.
Operated on 300 Ft. Span 50 HP Hoist
Grizzly, 8" Opening Slope 30°, To remove occasional large boulders
Fines
Boulders
Broken by hand
Stationary Screen, 2½" Sq. Opening
Slope 45°
Fines
Coarse
30 Cu. Yd. Bin
Elevator, 12" Belt, 10" Buckets, 12" C to C
Slope 60°
Telsmith Crusher, #4, 1¼" Opening
25 HP Motor
Belt Feeder, 12" C to C, 18" Belt, 260 Ft./Min.
5 HP Motor
Jeffrey Conveyor 75' C to C, 18" Belt
260 Ft./Min. Slope 23°, 10 HP Motor
Feed Splitter
2 Trommels, 42" x 9', 16 RPM. Slope 0.9"/Ft.
Stationary Screen, ⅛" Opening
Two 2" Jets
Sprays
Pea Gravel Storage
Overflow Waste
2 Dewatering Wheels
6" Pipe line
1¼ to 2" Rock
½ to 1¼" Rock
Concrete Sand
Engine Sand
4 Bins, 8 X 20, 38 high
8 Pivotal Bin Gates & Chutes.
(4 RR loading, 4 Truck loading
4" Centrifugal Pump 400 Gals./Min
120 Ft. Head. 20 HP Motor.

Fig. 3—The flow sheet of the Orman Crushed Rock Co.

by a 10-hp. Lincoln motor, discharges into a feed-splitting device at the top of the screening plant.

Screening and Washing

The screening is done by two 42-in. x 9 ft. trommels, each provided with three sections of screen; the slope of the trommels is 0.9 in. per foot; the speed, 16 r.p.m. The trommels are of the spider type, with conical hoods at the head end. The first two sections of screen are steel wire mesh, ¼ in. opening, held in place on the spiders by steel bands and may be rapidly and easily changed to make replacements or changes, with little loss of time. The trommels are driven by chain and sprocket, and either one may be disconnected by clutch while running at half plant capacity through the other. Water-tight steel hoppers are provided under each section of screen.

Washing is accomplished by forceful sprays consisting of 2-in. pipe perforated with 3/64-in. holes. In addition, approximately 100 gal. of water per minute are fed to each trommel with the entering sand and gravel.

The minus ¼-in. sand is collected in a junction box beneath the hoppers, from which it flows via the launder to the dewatering wheels. Two dewatering wheels, of the type common to the ore milling industry, are used in this plant to eliminate water and silt from the sand. Both wheels are driven by a single chain and sprocket drive and each wheel consists of a cast-iron pulley keyed to the end of a shaft extending into the dewatering wheel box at an angle of 45 deg. On the rim of this pulley are bolted 8x8 in. steel paddles which lift the sand over the edge of the box while the muddy water overflows to a waste launder at the rear. These wheels are handling approximately 150 cu. yd. of sand per 8 hr. and are producing sand almost entirely free from minus 200 mesh material. They require no attention whatever and may be adjusted to suit a wide range of conditions by controlling the amount of entering water and the height of the overflow lip.

The dewatering wheels and trommels are driven by a 10-hp. Lincoln motor. The coarse rock products from the trommels are chuted direct to their respective bins. Two bins are reserved for sand, served by a hinged launder designed to feed either bin, allowing one bin to drain while discharging into the other. This permits the loading of dry sand at all times and obviates the lining of cars and trucks which would be necessary if wet sand were handled.

Traction Sand

At times it is desired to make traction sand, locally termed "engine sand." To obtain this product the pea gravel constituent of the concrete sand (minus ¼ in.) is eliminated by inserting a stationary screen with ⅛-in. square opening at the junction box underneath the trommels. The concrete sand, ordinarily flowing direct to dewatering wheels, is passed over this screen, resulting in oversize (pea gravel), which is laundered out to the storage pile and undersize (traction sand), which flows to dewatering wheels and thence by gravity to the main bins. Fig. 1 shows the pea gravel storage pile at the left. As there is little demand for pea gravel ,this material will later be crushed by means of rolls to produce traction sand.

The main bin structure is 20 ft. wide, 32 ft. long, and 38 ft. high, divided into four bins of 100 cu. yd. capacity each, available above the loading chutes. The framework is of 8x8 Oregon fir, with a lining of 3x12 planks, 10 planks high, and 2x12 planks for partitions and the balance of the side lining. The framework is securely tied with 1¼ 1-in. rods, both transversely and longitudinally. The posts rest on twenty 28x28-in. concrete piers and the floor of the bin is concrete, resting on the ground surface and sloping to a drainage launder. All of the bins were filled with coarse rock up to the chute level at the start of operations to afford a rapid drainage medium.

Water for the plant is furnished by a Worthington single-stage, centrifugal 4-in. pump, designed to deliver 400 gal. per minute against a head of 120 ft. This pump is direct driven by a Westinghouse 20-hp. motor and the water is obtained from five wells 12 in. in diameter and 24 ft. deep, tapping the underflow from the Fountain river.

Excavation for the foundation was commenced on February 1, 1922, and on April 15—in 10 weeks—the plant was operating 100 per cent capacity. The costs were as follows:

	Total cost.	Percentage of total.
Power line	$ 1,250.00	4.6
Railroad siding	4,500.00	16.6
Grading for railroad track	400.00	1.5
Engineering	1,100.00	4.1
Labor, including foreman, 10 weeks	2,922.64	10.8
Grizzly	149.38	0.6
Belt feeder	276.31	1.0
Conveyor, 75 ft. centers, 18 in. belt	830.76	3.1
Trommels (2), 42 in. x 9 ft.	826.59	3.1
Hoppers for trommels	184.96	0.7
Dewatering wheels (2)	303.50	1.1
Crusher, including unloading and hauling to site	2,381.22	8.8
Power scraper and hoist, including unloading and hauling to site	3,971.04	14.7
Sewer and waste pipe	84.50	0.3
Pump, motor, wells, pipe and fittings	1,259.10	4.7
Lumber, 79,326 board feet	2,924.65	10.8
Shafting, bearings, chain, pulleys, belting, etc.	364.16	1.3
Bin gates and chutes	510.16	1.9
Motors (exclusive of pump motor)	995.60	3.7
Electrical equipment, wire, switches, conduit, etc.	507.87	1.9
Elevator and drive, complete	270.19	1.0
Lining launders	58.37	0.2
Bolts, nails, tie rods and washers	731.85	2.7
Cement for foundations	187.30	0.7
Miscellaneous	27.87	0.1
Total	$27,018.02	100.0

The plant of the Orman Crushed Rock Co. is owned and operated by Fred B. Orman and William T. Vedder, who were associates for many years in the contracting business under the name Orman Construction Co.

Fig. 4—Here the power scraper is discharging its load at the grizzly. The hoist house, conveyor, screening plant, and storage bins are on the right

Steel Powder as a Concrete Content

IN 1920 the Queensland Railway Department undertook a series of experiments looking toward the discovery of a formula for obtaining an impermeable concrete with which to reinforce concrete reservoirs. The results of these experiments were recently explained in a conference at Brisbane, in which it was stated that the use of a steel powder not only rendered the mortar or concrete more impermeable but added to the resistance and hardness of the mix.

It is recommended for use in concrete placed in either fresh or sea water because the metal seems to fix the cement and cut down the chemical action of the water. The sand used in the mix should be chosen with the greatest care. Half as much steel dust, which replaces part of the sand content, is used as is cement in any particular mixture. Care must be exercised in the mixing, and the consistency should be, according to the bulletin describing the experiments, "semi-liquid."

Production Costs of Rock Products

By Oliver Bowles

No. 1—Advantages Resulting from Low Production Costs. This well-known authority urges all producers of raw material to exert every effort to reduce selling prices to levels encouraging business activity. This article deals with the great benefits that will result. Mr. Bowles will write three more articles on practical methods of cost reduction

MUCH of the business stagnation now or recently in evidence is due to price inflation of raw materials, and until an advantageous price level is reached no decided improvement in conditions may be expected. An earnest effort should therefore be made by all producers of raw materials to devise ways and means of reducing selling prices to levels that will encourage business activity. An important way to accomplish this end is to reduce production costs. It is proposed therefore to discuss some of the outstanding features of cost reduction in their relation to both producer and consumer. This article deals with the wide benefits that may result from price deflation of rock products. Therefore, attention will be given to practical methods of reducing production costs as an important step in such deflation.

Advantage to the Producer

Reduced production costs permit lower selling prices with no reduction in net profit to the producer. In general, the producer prefers a low price level, for volume of trade with its attendant economies is much better than restricted sales at excessive prices.

The successful business man directs his efforts toward a rapid turnover, and reduces his selling prices to the lowest practicable point to accomplish this end. Thus it is in the interest of the producer himself that every effort should be made to so promote economies in production that his selling price may be kept at a minimum.

Advantage to the Consumer

The advantages of cost reduction apply not only to the producer, but possibly in greater measure to the consumer. The dealer in rock products is enabled to accomplish the rapid turnover that every good business man desires, and the consuming public, which practically means directly or indirectly the entire public, is permitted, as will later be shown, to enjoy more of the comforts and conveniences of modern living.

It is a truism that reduction in the price of useful commodities results in their wider application. When prices are excessive only a restricted circle of financially favored ones are able to enjoy the benefits which a commodity may bring, and with each reduction in price this circle is widened. The wider the field of usefulness of any product, the more desirable it is that a low price makes it generally available. A great reduction in the price of diamonds may bring the joy of possession to a greater number of individuals, but the real benefit to the world is insignificant when compared with that which results from increased availability of such unromantic though decidedly useful products as lime, cement or gravel. In fact, the reduction in price of luxuries does not always result in wider sales, for increased avaliability may make that to be somewhat despised which before was greatly to be desired.

In the field of rock products, however, we are concerned with types of commodities on which many of the comforts, conveniences, and even the necessities of life are dependent. Their use depends to a limited degree on human caprice or prevailing fashion, and thus their field of utilization is governed largely by the purchasing ability of the consumer. In the following paragraphs an attempt will be made to direct attention to some of the ways in which reduced production costs may bring definite advantages:

Benefits to the Producer

As reduced costs permit lower selling prices, the increased sales that result are advantageous to the producer in several ways. Production on a large scale is usually more economical than production on a small scale. Undercapacity production involves idle equipment and waste of power. Furthermore, a series of standing costs—such as insurance, rentals, taxes and amortization—have very little relation to volume of production, and thus greatly increase the unit cost in times of restricted output.

Low Prices Encourage Home Building

In the consuming industries reduced prices result in increased activity in all branches. Cheaper lime, cement crushed stone, sand, gravel, slate and gypsum particularly affect the building industries. Low prices encourage home building and lead to an increase in the number of those who own their homes. This is a highly desirable condition, not only because of the greater comfort and satisfaction of the householder, but because the ownership of real estate by the masses is the best insurance against anarchy, and a sure road toward national stability. The depression in home building during recent years is due chiefly to price inflation of building materials, and any marked decrease in the price of basic rock products would encourage increased building activity.

Encouragement to Public Works and Factory Building

Home building is but one branch of the construction industries that would benefit greatly by cost reduction of raw materials. In like manner, encouragement is given to public works enterprises such as harbors, breakwaters, sewage systems, and filtration plants, with attendant benefits to health and commerce. Also, lower-priced factory construction materials would encourage the establishment of new industries and the enlargement of present plants.

While this is an advantage to the plant operators, the desirable effects are wider than would at first appear, for lower factory construction costs lead to lower-priced factory products, and thus through the interdependence of modern industries the advantages are passed on from one group to another in an almost endless chain.

Increase in Highway Construction

The growth and prosperity of a community depend greatly on the nature of its highways. With the tremendous increase during recent years in the use of automobiles and in motor transportation of merchandise good roads are more essential than at any time in the history of the world. This condition adds to the importance of the fact that there is probably no activity to which greater benefit would accrue from low-priced rock products than that of road building. Tremendous and ever-increasing quantities of crushed stone, sand, gravel, and portland cement are used in highway construction. The road-building program

of many states has been seriously curtailed —with great detriment to the communities involved—through excessive prices of raw materials. A great increase in roadmaking would undoubtedly result from any marked recession in prices of the basic raw material. Every additional mile of improved highway adds to the nation's prosperity and comfort.

Promotion of Agricultural Prosperity

The general welfare of the country depends largely on agricultural prosperity. Low-priced rock products are directly advantageous to the farmer in several ways. Crop production on practically all land east of the Mississippi river is greatly benefited by the use of lime or limestone on the land, and thus a moderate price for these products is a distinct advantage. Also, the availability of good roads is of tremendous benefit to the farmer and, as previously pointed out, a low price for rock products encourages road construction. Likewise, better farm buildings, with their attendant comforts and economies, would follow.

Other examples might be cited, but it is evident from those already given that a reduction in the price level of rock products would advantageously affect the comfort and prosperity of practically the entire population of the country. Having pointed out the desirability of such a condition, the next article will deal with ways and means of attaining the desired end without in any way reducing profits or impairing the continued prosperity of the rock product industries.

(To be continued)

National Crushed Stone Association Convention of 1923

Plan of working and of data to be collected and presented for technical discussions on details of quarry operation and management

IN GENERAL the object of the program will be to collect information from every possible arrangement of any one detail so that a quarry operator confronted with a problem of track arrangement, for example, can obtain some data on every device that has ever been tried. The discussion should be less a matter of opinion than one of actual experience in operation.

By reporting records of accomplishments it is hoped to challenge other producers to show better records; at all events, enable each operator to compare his results with those reported, keeping in mind the character of the stone quarried and other details, where they affect the detail under discussion. Such comparisons would have immeasurable value and are possible. Costs should not be given in dollars and cents but in hours of labor and quantities of material employed.

Stripping

Advisability of stripping, noting effect where it is not done. In stripping devices the following alternatives suggest themselves: Scrapers, wagons and similar methods need hardly be discussed; shovel and industrial track, where practicable.

BY THE invitation of President W. Scott Eames, of the National Crushed Stone Association, and with the approval of the executive committee, the preparation of a program for the next convention of the association has been placed largely in the hands of Nathan C. Rockwood, editor of Rock Products, as chairman of the program committee, which includes W. Scott Eames; William H. Hoagland, president of the Marble Cliff Quarries Co., Columbus, Ohio; John Sloan, secretary of the Wisconsin Granite Co., Chicago, Ill., and A. P. Sandles, secretary of the association.

It is the intention of President Eames and the program committee to make this convention a real opportunity for all quarry operators to acquire a comprehensive knowledge of every phase of quarry operation and management—at least, as much as can be crowded into three brief days.

To develop such a program requires whole-hearted co-operation from every operator, big and little. All must come to the convention to contribute of their own special knowledge and experience, as well as to profit by the knowledge and experience of others.

There will be a number of contributed papers by operators of large experience and special knowledge, but the main success of the program will depend on free-for-all discussions and data spontaneously contributed from the floor of the convention.

These discussions will be properly recorded, edited, compiled, indexed and published in such a way that they will be of actual and permanent value to every operator.

An invitation is extended to every quarry operator in the United States and Canada to take part in the deliberations of this convention and to contribute his bit to a comprehensive discussion of a big, basic American industry.

Although not definitely decided at this writing, the 1923 annual convention of the National Crushed Stone Association will probably be held in Chicago, January 15, 16 and 17, which is the same week that the American Road Congress will meet (also in Chicago).

In presenting the accompanying outline of subjects which, it is hoped, will be developed in detail at the convention, the editor wishes to acknowledge his indebtedness to R. W. Scherer, of the Western Lime and Cement Co., Milwaukee, Wis., formerly secretary of the Wisconsin Crushed Stone Association, and for many years a quarry owner and operator.

Cost as compared with hand work; dragline and clamshell have been used somewhere to fill old quarry workings; hydraulic removal of overburden is used at Alton, Ill., and numerous other places. It is practicable in many places where it hasn't been tried and is very cheap. Another method is spouting the material to the cars on the quarry floor.

Drilling

Tripod drills (air and steam), well drills (gas and electric); rotary drills, such as are used in making core holes, are a possibility. The types of drills must be discussed with reference to the character of stone worked and results can then be compared.

Blasting

Placing the holes, how far from face and how far apart, how far below the floor of the quarry and their size. Percentage of powder used and quantity. Results are to be given in tons per pound of explosive of stated strength and must state to what size the blast reduces the rock; for instance, in a limestone quarry where the beds range from 6 to 12-in. deep, the blast produces stone suitable for a 36-in. gyratory crusher, etc.

Reblasting, that is, a further reduction by explosives, of stone that is too large for shovel or crusher; the "dobie method" or surface shooting and the hammer drill method; a comparison of costs between these two methods, and with sledging, etc.

Quarry Manipulation

Hillside working in one bench or in several benches; working from the surface down, the usual method is to make an opening and enlarge that; the channel method is applicable to a great many quarries. Working in several terraces can be described at various quarries. Tunneling is done in some quarries. In the far west "glory-hole" quarrying is in vogue.

The height of quarry face most economical to work for various shovels and for hand work needs to be discussed; also the desirability of maintaining level quarry floors. This touches on what is known as "hogging" a quarry. The methods of sinking to a lower level should be watched for and commented upon.

Loading

In hand-loading, records in tons per hour per man should be given, stating the stratification and character of the rock. Piece work and its cost per ton based on prevailing wages for labor. Shovels, when feasible. A No. 6 crusher quarry in Wisconsin uses a small shovel to good advantage. Records of performance with shovels of a given size, keeping in mind the character of the rock and size of cars loaded. Costs stated in number and class of men required to operate and in fuel consumed.

Track Arrangement

In hand-work quarries the radiating spurs are generally used. At an Iowa quarry a double track follows the face and is cheaper and satisfactory to operate if the blasting is done at once all along the face. Turntables and how to avoid them. At some quarries a shift track is used, not much worse than a turntable which may be found expedient.

In steam-shovel quarries there is a great deal of delay on a double track following the face.

Quarry Transportation

In small quarries gravity is used to carry the loads. At some quarries there are instances of the loads pulling the empties back into the quarry; it would be interesting to note at what degree of incline and what length of cable such an arrangement is practicable. Horses or mules in the quarry are quite general. Locomotives and their performance should be discussed. What grade will they negotiate with a given load? Electric trolleys are used to some extent and also gasoline locomotives.

Quarry Cars

End-dump, bottom-dump, and side-dump; the durability of armored wood cars as compared with all-steel cars. In the size of cars records of quantities actually carried up an incline in 10 hr. or spotted at a shovel in a day will prove enormously interesting. It has been said that it is physically impossible to carry 500 yd. per day up an incline of any length in 2-yd. cars.

Hoists and Inclines

Include also the tripping device or unloading device. Several plants have a special home-made device for dumping cars.

Crushers

Capacities of various sizes and records of performance should be discussed. The capacity of a crusher depends as much on the size of stone received as upon the size to which it is reduced, so that the whole question is one of division of work and the ratio of reduction. How far this division of work should go to attain maximum efficiency, a comparison of plants should fairly well determine.

Jaw crushers have a big place in that they furnish great opening for the capacity of the machine. To obtain an equal opening in a gyratory would require a machine of two or three times the capacity.

Screens

Stationary, revolving, vibrating or pulsating, and shaker screens; grizzlies and revolving grizzlies and scalping screens. The economy of thorough screening; many plants are losing valuable fines by failing to get them out of the next larger size.

Elevators and Conveyors

The desirability of eliminating as many of these moving parts as possible. The capacity of elevators of stated size must be determined. The fact that returns from secondary crushers must be carried up twice is usually lost sight of. Belt conveyors and devices for feeding belt conveyors and elevators.

Bins and Storage Devices

There are huge storage bins at some plants. Probably no plant needs bin capacity greater than one day's output. Belt conveyors on a high trestle with tunnel over ground storage should be described. At one plant a high cable and clamshell are used for storage and reclaiming. The smallest plant having a locomotive crane should be noted.

Early Program of Highway Congress and Road Show

WITH the early start made during the summer through partial reorganization and an election of officers in the American Road Builders' Association and the creation of the Highway Industries Exhibitors' Association to bring about closer co-operation, arrangements are being perfected for the Thirteenth American Good Roads Congress and Fourteenth National Good Roads Show to be held in Chicago, January 15 to 19.

It is the intention to separate the congress and show ,the former at the Congress Hotel and the latter at the Coliseum. It is believed this arrangement will be more satisfactory, as it will obviate the necessity of shutting down the operating machinery during the sessions.

The executive committee—Charles M. Upham, North Carolina highway engineer; James H. MacDonald, highway engineer, New Haven; J. H. Cranford, the Cranford Paving Co., Washington—appointed Messrs. Upham and MacDonald and the Highway Industries Exhibitors' Association designated its president, S. F. Beatty, vice-president of the Austin-Western Road Machinery Co., Chicago, to act as a committee having general charge of the arrangements for both the show and the congress. The exhibitors committee has employed C. W. Kelley of Chicago, who has managed some of the biggest expositions in the country, and the publicity committee has re-engaged C. S. Lee of New York, who handled the publicity work for the shows and conventions in 1921 and 1922.

The association has opened new offices at 37 West Thirty-ninth street, New York City, the old ones at 11 Waverly place having been abolished. Headquarters will also be opened in Chicago long in advance of the congress and show.

The Transportation Breakdown

Various views of mineral aggregate producers and a railway expert

EVERYWHERE highway construction and building work is being held up for want of materials. Losses mounting to millions of dollars will result. Many producers of building materials, particularly producers of sand, gravel and crushed stone will be forced to the edge of bankruptcy, if not over the edge. Hundreds of millions of dollars of the public's capital will be tied up in incompleted construction. Thousands of contractors will have their profits and their capital eaten up by overhead before they can complete their contracts, due wholly to delays in getting material.

Is it any wonder that producers of building material are getting desperate? Is it any wonder that desperate measures seem the last resort? If the Declaration of Independence and the Constitution of the United States mean anything at all, they mean that a fair deal is assured to every American citizen. Is it a fair deal to deprive one industry of the right to live in order that preferred industries may have all they want or need? Is there any longer such a thing as a moral right to live?

Below are the views of several men qualified to speak from different angles. Let the reader be his own judge of the statements set forth:

*Alex W. Dann on Priorities**

"Do we not find, really, that the issuing of priorities is conducive to improvident buying by the consumer, and in some quarters a desire to increase the demand for and the stabilizing of the price of fuel? It would really seem that the very knowledge that in case of a shortage, extreme measures can be and may be had recourse to under the emergency clause of the transportation act, and may actually invite this flurry and confusion which we have in the industry of mining and marketing fuel—is it fair, really, that the construction industry, of which we are a very essential part, should bear, as they seem to be doing, such a large proportion of the burden during this unwholesome situation in the fuel industry?

"What we mean by a fair and square deal, what we feel and are convinced is a fair and square deal in the matter is this: That in case of a shortage of transportation facilities, whether that shortage be brought about by a shortage of cars, or men, or engines or main tracks, or terminal facilities, that every industry shall share evenly and share alike in the unfortunate shortage of transportation facilities which, through those causes, may confront us."

W. C. Markham on Effect Priorities of Road Work

"Acting on behalf of the American Association of State Highway Officials, which is composed of the state highway departments of the entire 48 states, I wish to submit the following statement with statistics, showing the ruinous effect of Orders Nos. 23 and 24 upon the great industry of highway construction, whose ultimate purpose is improved highway transportation.

"We recognize the modifying order issued September 20, 1922, but believe that that is not sufficient to meet the exigencies of the case.

"There is no controversy as to priority of claims concerning the movement of coal where the necessities and comforts of human life are concerned. But when these needs are met, it is our contention that priority of claims should not eliminate any necessary industry, keep men from earning a livelihood to pay their coal bills, or take the responsibility of forcing any industry to the wall. All should have their proportionate share.

"This is not simply a matter in which the state governments are interested. The federal government has entered wholeheartedly into the expenditure of funds for road improvement, and in addition to the appropriations already made, has pledged herself to the extent of $60,000,000 for 1922-23, $65,000,000 for 1924, and $75,000,000 for 1925.

"We have been urged repeatedly by federal officials to eliminate non-employment by advancing a large road-building program, and yet it seems that we are repeatedly confronted at this season of the year with other federal requirements which bring to naught the program outlined.

"We realize that conditions at present are not so adverse as they were when priority order No. 2 placed the movement of road materials in the same category as the movement for materials for the making of musical instruments, and yet we have been playing second fiddle a long time."

V. O. Johnston—"Give the Railways a Chance"

"I believe if you (the I. C. C.) would remove that priority order and say to the railroads of the country 'We are putting it up to you to move just as far as you can the entire freight that is offered,' giving the so-called No. 1 preference, that they can do that. They have their superintendents and agents and superintendents of motive power to get right to the situation, which you can't possibly do if you have 100,000 men around the country. They know it, and they can do it. A good many of them have been doing it. I will tell you some of them have been doing it contrary to the orders of this commission, and it is two years ago. They took care of us and others at that time. There is a very close relation between railroads and coal, and many of them will favor coal mines with cars when they will not favor sand and gravel; and there are some other railroads where the reverse is true. But I am speaking generally and I believe it, and from the observations I am able to make, the country generally would be better off and no one will freeze. There may be, as there will be in any event, some scrambling to get coal at anything like a reasonable price, if we make up our minds we are not going to be gouged.

"I have lived out there in Illinois and gone through a strike every two years since 1905, and we found the price prior to the strike always went up after the strike. The public was gouged, and they will be until we rise up and enact some sort of legislation that protects us on coal and other essential products the way we are protected on transportation. We are coming to that."

W. Scott Eames, President of the National Crushed Stone Association

"The reports we have received from building trades state that there are 166,552 projects under construction—hospitals, sewers, sanitary disposal plants, sewerage systems, bridges, schools, manufacturing plants, and so forth. It is evident that there is a large amount of construction work which is not reported and is not available in estimating.

"These building projects total the enormous amount of $2,362,875,800 up to September 1. By January 1, if this work is not curtailed, the amount will reach over

*Hearing before the Interstate Commerce Commission, Ex Parte 83, September 21, 1923. Mr. Dann is president of the National Association of Sand and Gravel Producers.

$3,500,000,000. It is estimated that fully 50 per cent of this work is now completed, and the contractors are anxious to finish the larger part of the remainder before cold weather sets in. If this tremendous amount of work is stopped suddenly, and is not permitted to be continued, a great hardship will be created against all allied businesses associated in the building trade.

"In the United States there are approximately 1900 stone-crushing plants, permanent commercial plants of substantial output capacity, employing at their peak of production 114,800 people, upon whom 459,200 others are dependent.

"The invested capital in these plants is over $322,000,000. The annual production of these plants is 252,000,000 tons of material. In addition to the stone-crushing plants, there are as many, if not more, sand and gravel companies which have a large production, large investment of capital, and a large number of men employed.

"Since your Order No. 23 has gone into effect, some of our largest producers of material have received only 10 per cent and less supply of cars, causing a probable closing down of many of these plants.

"We sincerely hope and pray that Order No. 23 can be amended so as to afford relief until November 1, or longer, if possible."

Samuel O. Dunn, Editor of the "Railway Age-Gazette," Gives Railway's Side*

"By long odds the most outstanding feature of the present railway situation is the inability of the railroads to move the freight being offered to them. The farmers cannot ship the crops they already have harvested, and the wheat has not all been threshed and the corn is not yet gathered. Every single industry in the country is reporting that its shipments, and many that their production, are being restricted by lack of transportation.

"I wish I could assure you that this situation is due to temporary conditions and that it will soon be improved. I cannot do so. The coal strike has created an abnormal demand for the transportation of coal. The railway shop employee's strike has left all the railways somewhat crippled and some badly crippled. These things have made the shortage of transportation greater than it otherwise would have been, and their effects cannot soon be removed.

"But the fact is, that although the coal strike and the shop employees' strike have aggravated the present transportation situation, they have not created it. It is mainly due to two series of developments. The first of these is the very large increase within recent months in industrial and commercial activity and, in consequence, in the freight offered to the railways for movement. The second is the long decline which has occurred in the expansion of the railroads. If all the locomotives and cars now owned by the railroads were in normal condition, they could not handle anywhere near all the freight that is being offered to them, and which, in the months ahead, will be offered.

"Everybody knows that, with occasional setbacks, the production and commerce of the United States always have rapidly increased. Too few have paused to consider that every increase of production and commerce causes a corresponding increase in the demand for railroad transportation, and that unless the capacity of the railroads increases in proportion to the productive capacity of our farms and industries the effect must be to limit production and commerce of all kinds. At a time when most people are rejoicing because general business activity is reviving it is not pleasant to be obliged to express the opinion which, however, I do express, that because of lack of transportation there will not be, and cannot be, any such increases of production and commerce in this country in the months and years immediately ahead of us as there have been during corresponding periods of business revival in the past.

"There is no better measure of the increase which has occurred in any period in the volume of production and commerce than the increase in the volume of freight shipped in that period. In the ten years ending with 1907 the increase in railway freight business in this country averaged *14 billion tons carried one mile* annually. In the next 10-year period, that ending in 1917, the increase in freight business averaged almost *16 billion tons carried one mile* annually. The average increase per year in the 20 years from 1897 to 1917 was almost exactly *15 billion tons carried one mile.*

"In the latter part of that 20 years the railways had greater and greater difficulties in handling the normal increase in their business. Congestions and so-called shortages of cars ceased to be merely occasional and sporadic, and became chronic.

"In order to increase the business handled, the government assumed operation of the railways at the beginning of 1918. In spite of all the efforts made under government operation, it was found impossible to increase the freight moved in 1918 more than two-thirds as much as what had previously been a normal increase. In 1920, with the railways again under private operation, the managements exhausted their utmost resources in efforts to handle all the business offered. They again increased the freight moved, but they failed by a substantial margin to move all that was offered. The average increase in the amount of freight moved annually in the three years ending with 1920 was only *five billion tons carried one mile* or *only one-third* of what had been the normal annual increase during the preceding 20 years.

"Now we have a large freight business offered again. What is happening? The railways are putting forth the utmost efforts to move it, and they are not yet quite equalling the record made in 1920. In due time, if the conditions remain reasonably favorable, they will equal and surpass that record. But consider what these facts mean. Never prior to 1917 did the railways, when business was large, fail to move an amount of freight which substantially exceeded all previous records. Now they are finding it extremely difficult to equal the record of 1920, although in the three years ending with that year they increased the traffic handled only one-third as much per year as they had previously increased it for twenty years.

"To what is this situation due? Statistics are always tiresome and often confusing, but I must give you some to show what has happened. Probably you have seen statistics showing that year by year for the last 20 years the number of new locomotives and cars put into service has rapidly declined. It has sometimes been answered that the new locomotives and cars have been more powerful and larger than the old ones, and that therefore this decline in the number of new ones acquired does not show a corresponding decline in the expansion of the capacity of the railways. Let us then use statistics regarding the increase in the total tractive power of locomotives and the total capacity of cars. In the five years ending with 1907 the average *annual* increase in tractive power of all the locomotives in service was 128,000,000 lb. In the seven years ending with 1914 the average *annual* increase was less than 75,000,000 lb. In the seven years ending with 1921 it was only 63,000,000 lb. In the year 1921 it was less than 39,000,000 lb.

"Now, take the capacity of freight cars. The average *annual* increase in the total capacity of all the freight cars in the country in the five years ending with 1907 was 5,000,000 tons. In the seven years ending with 1914 it was less than 3,500,000 tons. In the seven years ending with 1921 it was only 1,000,000 tons. In 1921 it was only 500,000 tons.

"These figures indicate clearly how increases in the power of locomotives and capacity of cars have declined until they have almost ceased. The development of the other facilities of the railways has declined in equal proportion. The increase in the total tractive power of locomo-

*From an address before the annual meeting of the Associated Business Papers at New York City, October 12, 1922.

tives was less than one-half as great in the seven years ending with 1921 as in the seven years ending with 1907. The increase in the total capacity of freight cars was only one-fifth as great in the seven years ending with 1921 as in the seven years ending with 1907. No man in his senses can expect the railways, in view of these facts, to deal successfully with anywhere near as large an increase in freight as they easily dealt with when business revived after the panics of 1893 and 1907, and after the depression of 1914 and 1915.

"It was long predicted by those who opposed the policy of restrictive railway regulation that in time it would result in making railroad transportation the limiting factor in production and commerce in this country. That prediction, unfortunately for everybody, has now been completely fulfilled. Almost every other condition is favorable to an increase of production and a revival of prosperity such as we had after the panic of 1893, after the panic of 1907, and after the depression of 1914 and 1915. The railroad situation makes impossible for the present any such increases of production and commerce as occurred then.

"This limitation upon the country's prosperity and development must be removed. How can this be done? The answer is simple and obvious. The influences which have reduced and almost stopped the expansion of the railroads must be removed. Much the greater part, or all of this reduction of the expansion of the railroads has been due to the policy of government regulation which has greatly reduced and narrowly restricted the net return earned by them. This reduction and restriction of their net return has driven new capital from them. Unable to raise new capital in relatively as large amounts as in former years they have been unable to develop and increase the capacity of their properties as formerly. Under the Transportation Act they were assured in 1921 a net return of 6 per cent. Business fell off, expenses were high, and they earned and received only 3.3 per cent. Under a ruling of the Interstate Commerce Commission it is now held that they are entitled to earn 5¾ per cent. Thus far in 1922 they have earned 4⅓ per cent. They never can raise enough new capital adequately to develop their facilities until they earn a much larger net return. With the large increase in business that is now occurring and the shop employees' strike behind them, they probably can soon begin to earn the 5¾ per cent to which the Commission says they are entitled. But how long will it be after they begin to earn it until there will be another widespread demand for general reductions of freight rates?

"The public long has been told that the railroad problem of this country was ceasing to be one of rates, and was becoming one of lack of transportation. The public, however, has insisted in regarding the problem as chiefly one of rates and in consequence cannot now get, and for a long time will be unable to get, anywhere near enough transportation. It will lose many times more in a short period by this lack of transportation than it has gained in the last ten years by keeping rates on a basis which has almost stopped railroad development.

"Do not in this crisis denounce the managements of the railroads. The farmers and business men and the regulating authorities who have done what the farmers and business men have demanded are the people who are responsible. There is no immediate remedy for the present transportation situation. It must be borne as best it can. It can be remedied in time by the adoption of a wiser and fairer policy which will let the railways earn the net returns they require in order to furnish adequate service. There is no other remedy under private ownership, and very few business men wish to take a chance with government ownership."

Plasticity of High Calcium Lime

THERE seems to be a well-established opinion among the lime men of the middle west, declares Arthur E. Truesdell, consulting engineer of Pittsfield, Mass., "that high calcium lime is not plastic when slaked. For example, Mathers makes the statement (page 34, Rock Products, August 12, 1922) that in his investigations 'No method of making plastic lime from the high calcium limes was found.' Perhaps he did not intend to refer to other than the limes with which he worked.

"In the interest of progress it should be known that some high-calcium limes are plastic—in fact, highly so. Such limes from western Massachusetts enjoyed high favor before hydrates were placed on the market and do today, because of their plasticity. They are crystalline in structure, very hot, and must be slaked carefully to prevent burning.

"It would seem wise when new plasticity investigations are undertaken, to include some samples of these limes; as comparison with others at differing stages may suggest new avenues for investigation which would be of value.

"Plasticity itself is a physical characteristic of the slaked lime and so it would seem natural to investigate the physics of the case before going into the chemical side, which may prove to be unnecessary. To mention a few of the simpler suggestions: Stones can be investigated as to appearance, porosity, etc. Microscopic slides made for comparison. Methods of burning compared. Samples can be subjected to identical heat treatment, and results noted. Slaking can be carried out under varying conditions on different samples. Possibly some of this work has been done already.

"There seems to be an almost limitless field for investigation among the limes. We are still trying to discover the causes of some of the principal characteristics of our two main kinds; dolomitic and high calcium. When we consider the possible influence of the dozen or so minor impurities present in small degree in most limestones and in varying ratio to each other, the imagination only can depict our condition. We hope they have no effect on plasticity, for example, because we want an easy problem.

"Most lime men know that some impurities, present in small amounts, will absolutely kill an otherwise excellent limestone. Chemists have passed limestones high in calcium only to find the burned product unslakable."

A Special Convention

THE NATIONAL ASSOCIATION OF SAND AND GRAVEL PRODUCERS will hold a special convention at the La Salle hotel in Chicago, Ill., November 15, at 10 o'clock, to take action on proposed changes in its constitution. These changes will make for wider usefulness and co-ordination of the association's efforts, and a representative attendance of the industry is especially to be desired.

Do You Need Alabaster Stones?

THE A. A. Lissner Co., Inc., 26 Broadway, New York City, has requested Rock Products to advise if any of its readers would be interested in the importation of rock plaster, alabaster stones from Algeria.

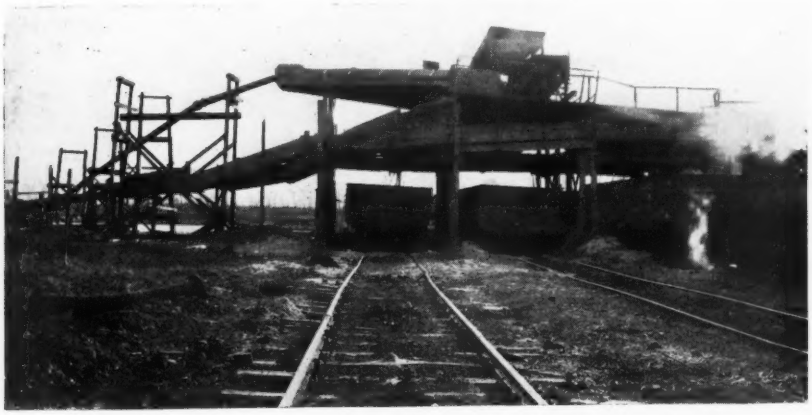
While considerable quantities of gypsum are imported from Nova Scotia, it may be that East coast plaster manufacturers could use this instead.

Screens for Washing Plants – I

The first of this series discusses the right and wrong uses of stationary screens, the principles on which they work, and suitable fabrics

By Edmund Shaw
Consulting Engineer, Chicago, Ill.

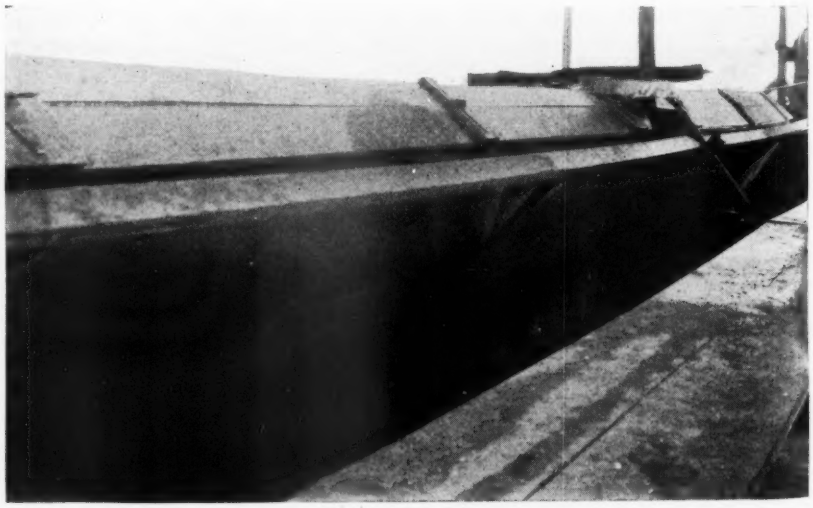
STATIONARY screens are not used in washing plants as much as they used to be. The adoption of more rigid specifications for sand and gravel by the various state highway engineers has called for better screening at the plants, and in many cases stationary screens have been thrown out and the more efficient revolving or vibrating screens put in. In newer plants, the use of stationary screens (or gravity screens, as they are sometimes called) seems to be confined to small plants and those of a temporary nature.



Plant employing stationary screens showing the "apron" for spreading out the feed for a wide screen

While this is true, it is also true that a stationary screen is *theoretically* capable of doing as good work as any other screen. There are very large and important plants that use them and get excellent results from their use. They have a considerable advantage in being simple and requiring no direct application of power through pulleys and belts or gears, and in screening the larger sizes of grains, where, as will be shown later, a large screening area is not required, they are especially useful. In fact, the use of one type of stationary screen, the grizzly or bar screen, at the head of the plant, is almost universal.

And it is probable that a great deal of the prejudice against this type of screen has come from the fact that so many of them are of the wrong shape or that they are improperly installed. The commonest error seems to be making them too long in proportion to their width. Many of them are set at the wrong pitch, and many others would do better work if a different fabric than the one in use was to be chosen. For all of which reasons—although there is no desire to start an argument either for or against its use—the stationary screen would seem to be worth some consideration.



Waste stationary screen in action

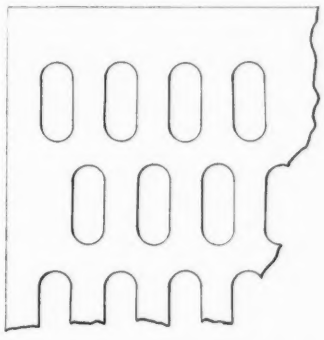
Edison's Scientific Stationary Screens

In dry screening for rock-crushing plants, the stationary screen has been developed into a very scientific and highly efficient device. This is largely due to the work of Thomas A. Edison, whose genius has found expression in so many different fields. A description of this type of screen is to be found in the issue of Rock Products for Sept. 23, 1922, in the description of the plant of the Tomkins Cove Stone Co. There it is noted that this type of screen has been in use in this plant for 12 years.

The original screens of this sort were placed by Mr. Edison in the big iron ore concentrator which he built in New Jersey about 25 years ago, and the records made with the screens at that time were remarkable. One set of such screens, making a 14-mesh product, screened 300 tons per hour of undersize, and the screen area given figures out at the low area of 281 sq. in. per ton per hour. Tests with hand screens on the products are stated to have shown that 85 per cent of the material that should have passed through the screen did pass through.

It should be stated in this connection that the material was very dry and that small percentages of moisture were found to affect the work of the screen. Also,

that while these facts have been known to crusher men and metallurgists for a great many years, the stationary screens of this type have not come into general use in the field of work to which they seem particularly adapted.



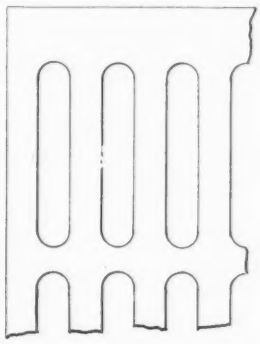


Fig. 1.—Slotted punched metal used in stationary screens. Staggered slots prevent water and fines finding a straight path, and long straight slots used in dry screens

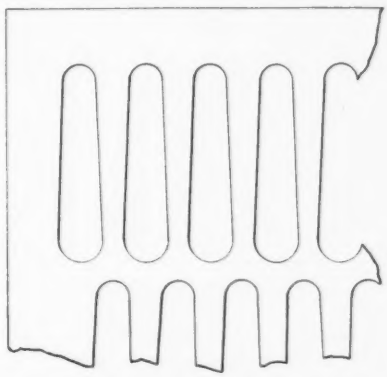


Fig. 2—Slots widened in the direction of flow to prevent blinding

Screening Principles and Causes of Poor Work

All screens have much the same method of operation. The material is caused to travel over the screen or, as in the case of the revolving screen, the screen is pushed under the bed of the material. The rate of travel of the material must be such that every grain has a chance to get through the screen openings; if it goes too fast it will jump over them, and if it goes too slow the capacity will be cut down. On a stationary screen the bed should be theoretically only one grain deep. On screens of other types a deeper bed may be maintained, as the action of the machine tends to stratify the bed and bring the fine grains to the bottom. This is especially true of the vibrating and shaking types of screens.

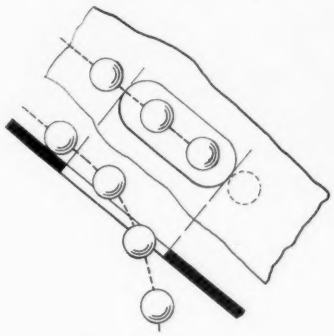


Fig. 3—Path of grain falling through a slot

"Blinding" is the chief cause of poor screening. A particle that is large enough to enter the mesh, but not to pass through, sticks in the mesh and puts that much of the screen out of commission. If the material to be screened contains many of the so-called "difficult" grains (those of the right size to cause blinding), it is only a short time before practically all of the screen is out of commission. Hence very often the screen work of the plant varies between very good and very poor screening, the good work being done just after the screen has been cleaned and the poor work just before. The problem of screening then is to find a way to pass the material to be screened over the screen in such a way that all of the undersize will have a chance to pass through and yet so that the difficult grains will not blind the apertures.

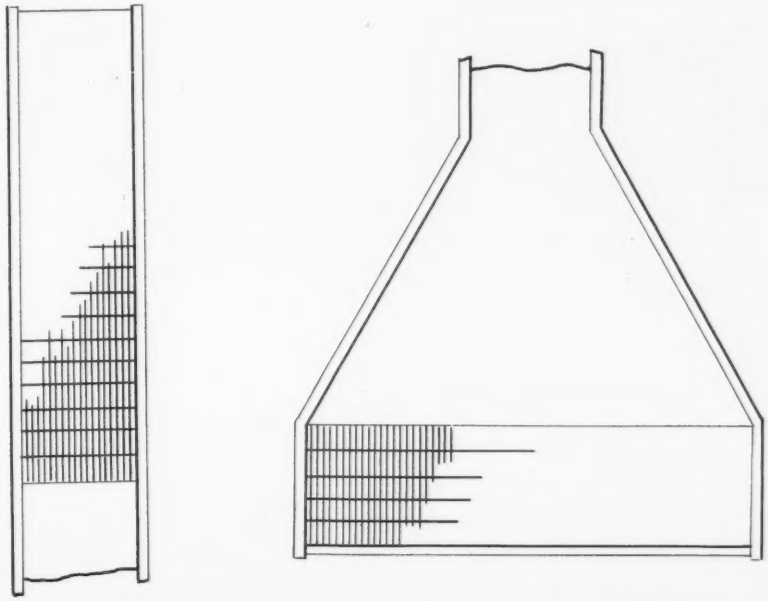


Fig. 4—Short, wide screens are more efficient than long, narrow screens

Pitch of Screen Most Important

In obtaining this result with stationary screens, the angle with the horizontal, or *pitch* of the screen, is the most important factor. The angle must be steep enough so that the material will flow, although if it is too steep there will be no tendency for the undersize particles to fall and they will jump over the holes. But it is possible in every case to find an angle or pitch flat enough so that the undersize particles will pass, and steep enough so that the difficult grains will not lodge and blind the screen. This being found, the quality of the work will depend upon such other factors as the area of the screen and the percentage of opening, the shape of the openings, relation of length to width of the screen, and other matters which will be considered later.

What Determines the Pitch

There are a great many things that determine the pitch of a screen, and one of

the first is the nature of the screen itself; that is, the fabric of which it is made. (Fabric in this case is used for punched plate and bar screens as well as wire

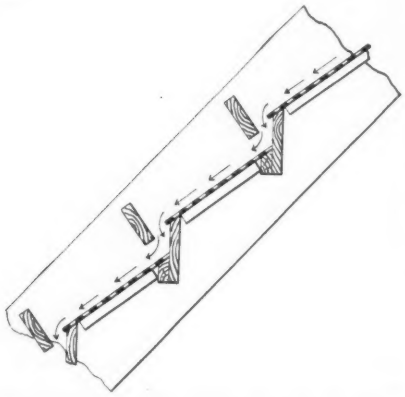


Fig. 5—This section shows a long screen broken into short, wide screens, with steps and baffles. It is more effective than a single long screen

cloth.) With a bar screen or grizzly, an angle as flat as 27 deg. has been used. Punched plate requires a little more pitch before the material will travel well, the limiting angle being about 32 deg. Wire cloth requires more pitch than any of these, the limiting angle being about 40 deg. These angles are for screening dry, or rather damp, materials.

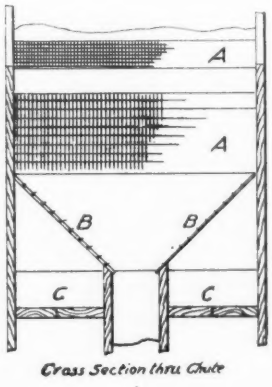
The nature of the material to be screened influences the pitch in about the same way. If there are plenty of large, round grains that will roll easily, a flatter pitch may be used than if the material contains a lot of flat and scaly pieces that must slide as they travel down the screen.

In wet screening, where the feed to the screen contains a great deal of water, two new conditions come in. The first is that the water flowing through the holes drags undersize pieces along with it, or washes them through, as we say. The second is that the feed may come on to the screen with a great deal of force of its own, and this force will take the place of gravity in causing the grains to pass over the screen; that is, the material is washed across the screen. So wet screens may be set flat, or may even bet set with a reversed pitch (uphill) if the flow of water is very strong, and still they will continue to screen. Usually, we find wet stationary screens set with pitches of 1 in. to the foot to 3 in. to the foot.

It is evident from what has been said that it is impossible to lay down any rule for finding the pitch of a stationary screen, there are so many factors which will influence the pitch. The best advice that can be given to the man who has one to build is to give the screen plenty of pitch at the start, for it can be reduced without much trouble, whereas it is generally a great deal of trouble and expense to change the plant so as to give the screens more pitch, especially if there is a series of screens.

The Best Screen Fabric—and Why It Is Best

As to the material of which the screen is made, it may be said that every sort of material that is used for other sorts of screens is used for stationary screens. Perhaps the most used fabric is that of woven wire, either single or double crimped. The reason for this preference is probably that a wire screen has the



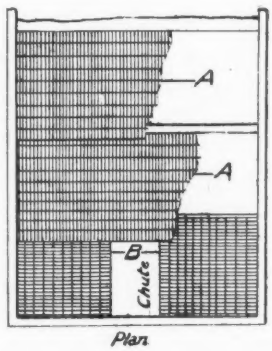
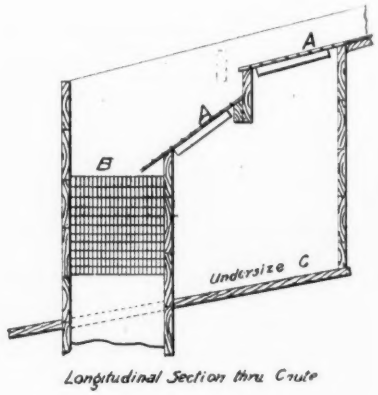


Fig. 6—How the oversize is carried in a chute through the undersize

largest percentage of opening, much larger than a punched plate screen. By percentage of opening is meant that percentage of the entire area of the screen that is in the holes or meshes. It is much larger with coarse screens than fine screens, which is one of the numerous reasons why it is so much easier to screen to a coarse mesh than to a fine. With coarse mesh screens, such as are used for screening gravel, the percentage of opening may be 75, 80, or even 90 per cent, whereas with fine screens—below 20 mesh for example—the percentage of opening will not much exceed 25 per cent if the opening is square, unless the wire is so light that the screen has a very short life.

The writer has seen woven wire screens that were doing satisfactory work as stationary screens, but his preference is for punched plates. His reasons are that the punched plate offers a smooth surface to the grain on which it slides without any hopping or jumping of the holes, and that the difficult grains are less likely to stick and blind the holes.

A further advantage is that punched plate may be worked at a flatter pitch, and thus some headroom may be saved, which amounts to something when several



sizes of screens are worked in series. But the percentage of opening in punched plate is low, as it is hard to make one with more than 50 per cent opening that will stand the wear and tear of regular work. This is partly compensated for by the fact that the percentage of opening is nearly constant with punched

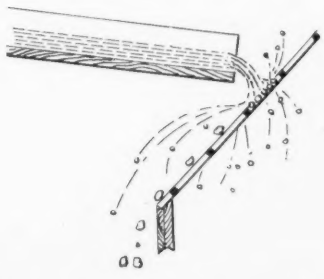


Fig. 7—The wrong way to feed a stationary screen. This section through the feed apron and screen shows how the oversize is contaminated by water splashing and carrying fines and clay with it

screens, and does not decrease as the finer sizes are approached the way it does with woven wire screens.

(To be continued)

Mining Show a Great Success

THE 25th annual convention of the American Mining Congress and the National Exposition of Mines and Mining Equipment, held in Cleveland during the week October 9-14, was a great success and of unusual interest to non-metallic mineral producers, due to the fact that the majority of the exhibits as well as some of the conferences were pertinent to the rock products industry.

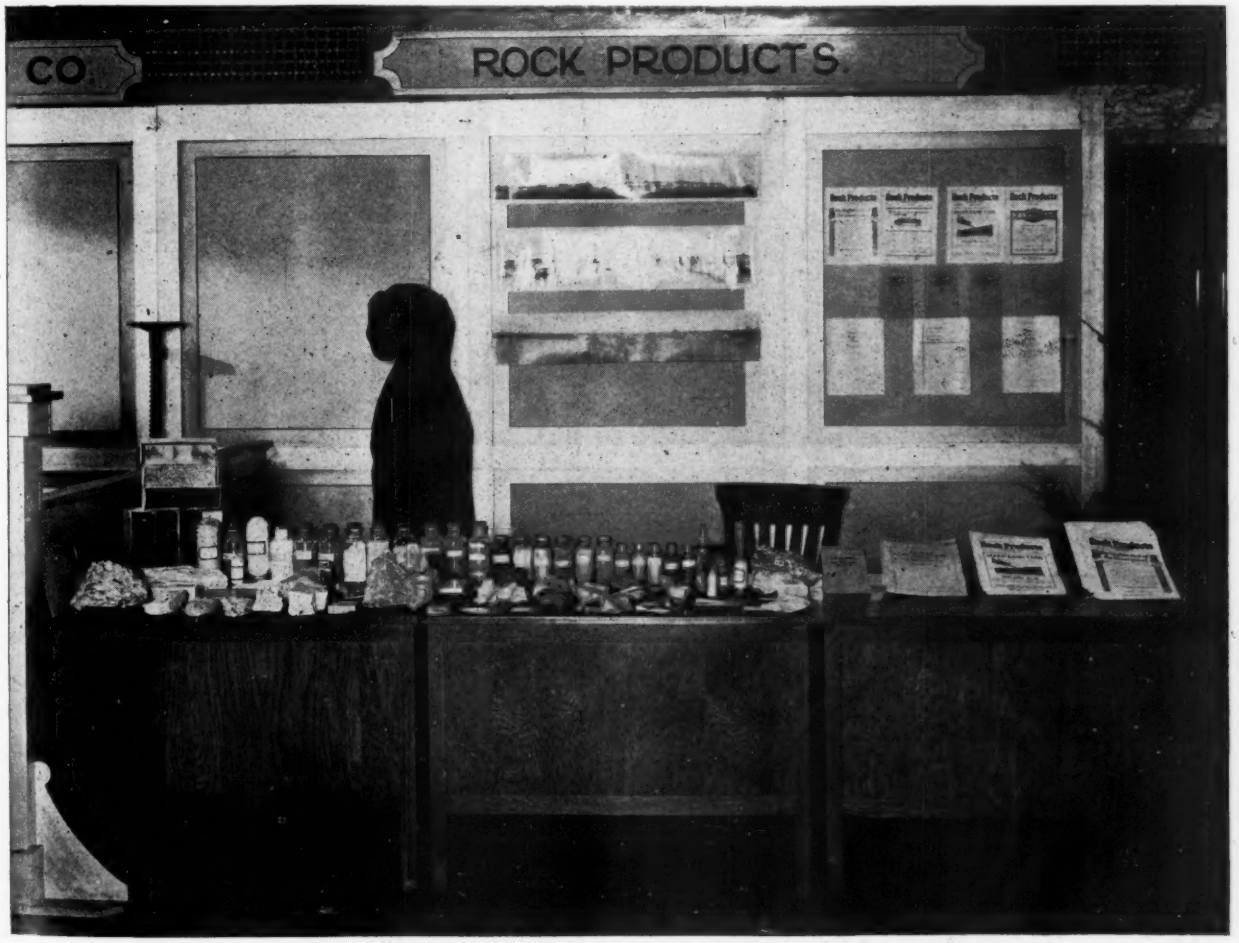
Of interest to the non-metallic mineral men were the conferences on oil shale, industrial co-operation, standardization, mechanical underground loading, mining, and loading and steam shovel equipment and drilling machines and drill steel. These will be given mention in ROCK PRODUCTS shortly.

ROCK PRODUCTS, as the representative of the non-metallic mineral industry, exhibited a collection of non-metallic minerals and the products manufactured from them. As the only mineral exhibit at the show it attracted much attention. It emphazised the general opinion that in future conferences and conventions the rock products industry should be given more thought and attention. This point was brought out by R. F. Grant, chairman of the Cleveland convention committee, who placed our industry on an equal footing with any other division of the entire mining industry.

During a conference it developed that the American metal and coal mining industry now represents an investment of $300,000,000 and that the annual production is valued at more than $700,000,000. Contrast these figures with the investment in the non-metallic field which, conservatively estimated, is over $400,000,000, with an annual production of $450,000,000. The low intrinsic value of the non-metals also brings out the fact that greater attention should be given to the simplification of the manufacturing process.

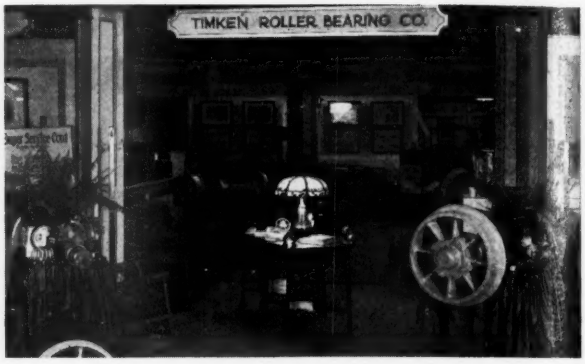
Among the rock products producers who visited the exhibit were: J. W. Shannon, superintendent Cayuga Rock Sale Co., Ithaca, N. Y.; Walter Doll, Sheldon Slate Products Co., Granville, N. Y.; P. E. Gandern, American Gypsum Co., Port Clinton, Ohio; J. W. Dinsmore, Pittsburgh Limestone Co., New Castle, Pa.; H. L. Gordon, Pittsburgh Limestone Co., New Castle, Pa.; John Kling and Edgar M. Lambkin, Kelley Island Lime and Transport Co., Cleveland; Hal G. Knight, Rubber City Sand and Gravel Co., Akron; Norman and Dave Callahan, M. A. Callahan, "The Sand Man," Cleveland; E. F. Klein, Gray Eagle Marble Co., Knoxville; Charles E. Miller, Armstrong Co., sand and gravel, Cincinnati; S. Stephanson, Arrow Sand and Gravel Co., Columbus; A. H. McComb, Universal Sand Co., New Castle, Pa.; J. S. Hall, Greenstone Products Co., Bluefield, W. Va.; H. A. Stephan, Michigan Limestone and Chemical Co., Rogers City, Mich.

Officers of the American Mining Congress elected for the coming year: Sidney J.



The exhibit of this magazine at the Mining Show at Cleveland, October 9 to 14

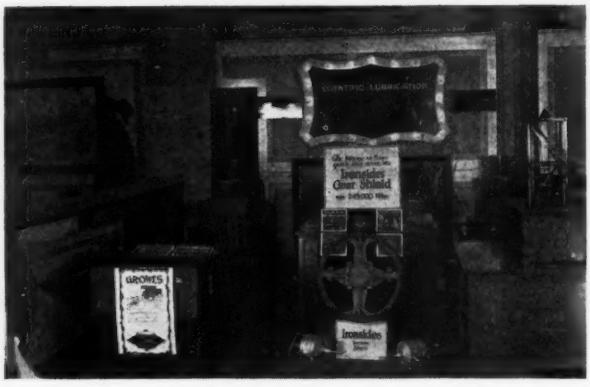
Mancha Storage Battery Locomotive Co.



Timken Roller Bearing Co.

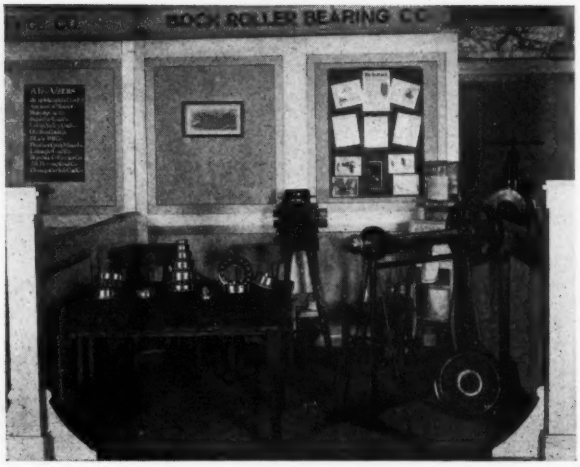
Oxweld Acetylene Co.

Marchant Calculating Machine Co.



The Iron Sides Co.

The Bristol Co.



Bock Roller Bearing Co.

American Steel and Wire Co.

Jennings, United States Smelting and Refining Co., New York, president; D. B. Wentz, Wentz Coal Co., Philadelphia, first vice-president; H. W. Seaman, Chicago, second vice-president; E. O. Doheny, Mexican Petroleum Co., New York, third vice-president. Other directors are: William Lindsay, Napier Iron Co. of Kentucky; Albert Nason, Nason Coal Co., Chicago, and W. C. Doering, Southern Wheel Co., St. Louis.

The manufacturers' division elected the following: W. C. Doering, Southern Wheel Co., St. Louis, president; N. S. Greensfelder, Hercules Powder Co., Wilmington, first vice-president; H. K. Porter, Hyatt Roller Bearing Co., New York, second vice-president; J. C. Wilson, Ohio Brass Co., third vice-president; H. F. Reck, Streeter-Amet Weighing and Recording Co., Chicago, and F. L. Morse, Morse Chain Co., Ithaca, N. Y., members. E. C. Porter and J. F. Gallbreath of the American Mining Congress, ex-officio members. Mr. Greensfelder was appointed director of publicity and he will wage a campaign for 200 members for the manufacturers' division. Milwaukee will be the next meeting place for the convention.

Interesting and Pertinent Exhibits

MERRICK SCALE CO., Passaic, N. J., demonstrated a full-size working model of its "weightometer," which will record the weight of stone, gravel, cement, sand, lime, etc., conveyed on a belt, bucket or pan conveyor without interrupting the flow of the material. This device was described fully in the October 7 issue of Rock Products. In charge were F. B. Hambright, sales manager, and T. F. Corpron, Michigan representative.

FEDERAL ELECTRIC CO., Chicago, exhibited a device used to demonstrate the practicability of its National multiphase fuse, which can be used on all three-phase installations. It consists of fuses so interconnected that in case one blows, the rest follow, eliminating the possibility of the motor running single phase and burning out. Railway lanterns, sirens and other general types of fuses were also shown. Those in charge were E. L. Ogle, chief engineer; O. S. Burke, manager siren department; R. R. Coombs, sales manager, and R. P. Pilkington, engineer.

IRONSIDES CO., Columbus, exhibited a line of lubricants useful to the rock products industry. One of these products, a "gear shield," is adhesive and clings to the gear tooth, thus forming a coating which saves the steel surfaces from direct contact—a "cushion" effect. Another of its products is the Ironside wire rope shield, a pliable, tenacious waterproof lubricating material which can be applied with a brush to the outside of the wire. Other products were Ironsides stack black, a preservative coating, and the Tormay oiler. Exhibits in charge of A. D. Richardson, sales and advertising manager, and E. D. Stackhouse, assistant sales promotional manager; R. R. Baxter, sales engineer, and L. M. Leonard, analysis engineer.

WEINMAN PUMP MFG. CO., Columbus, exhibited a 3-in. full ball bearing centrifugal pump capable of delivering 200 gal. per minute; a 4-in. high pressure multi stage pump, delivering 450 gal. per minute at a 500-ft. head, and a self oiling geared mine pump. Similar units have been installed in many work products plants. H. L. Bachman, secretary and sales manager, was in charge. F. W. Smith, Pittsburgh manager, assisted.

BRISTOL CO., Waterbury, Conn., exhibited its steam indicators, a new type of safety setscrew of a fluted design, and a complete line of steel and wire belt fasteners, lacings and plates for all transmission and conveyor belt installations. E. J. Klein, general sales representative, was in charge.

TIMKEN ROLLER BEARING CO., Canton, Ohio, exhibited a side thrust tapered roller bearing that is used extensively on quarry cars, conveyor belt idlers, locomotives, trucks, tractors, etc. E. D. Phillips, manager of mining sales, was in charge.

STEARNS CONVEYOR CO., Cleveland, Ohio, exhibited conveyor belt carriers equipped with Hyatt roller bearings and Alemite lubricating systems. It also manufactures a complete conveying equipment, car movers, rotary and shaking screens and wall winches. J. G. Stewart, sales manager, and C. H. Mount, advertising manager, were in charge.

IRONTON ENGINE CO., Ironton, Ohio, showed for the first time its new type of worm-drive storage-battery locomotive for use in mines with little headroom. It is built in heights of 25 and 31 in. This company also manufactures a complete line of trolley and storage-battery locomotives, as well as motor-generator outfits and switches. W. R. Youmans, chief engineer, and C. W. Chappelle, sales engineer, were in charge.

ALDRICH PUMP CO., Allentown, Pa., showed a Triplex plunger pump delivering 150 gal. per minute at 150 ft. head. It is driven by a 3-hp. motor and mounted on a truck with adjustable gage to fit any size track. The pump has phosphorus bronze fittings throughout and is equipped with a complete tool set. The company also manufactures a complete line of Triplex power pumps, in any desired capacity. A feature of these pumps is the porcelain plunger, ideal for quarry work and other purposes where ordinary plungers corrode and crack when not in use. H. W. Townsend, works manager, was in charge.

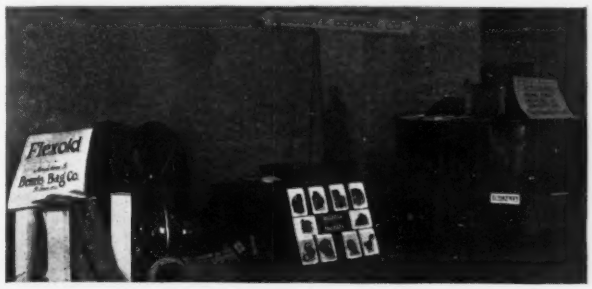
HILL CLUTCH CO., Cleveland, showed under actual operating conditions mechanical clutches, pulleys, hangers, etc., as well as a rigid collar oiling system for transmission machinery. H. Morrison, sales manager; H. F. Corrigan, sales engineer, and H. J. Biler, sales representative, were in charge.

BUCKEYE BLOWER CO., Columbus, demonstrated blowers, suction fans and reversible mine ventilating fans applicable to the rock products industry. W. I. Lawson, sales manager, was in charge. In conjunction with this exhibit the Bemis Bag Co., St. Louis, manufacturers of all types of bags, demonstrated its Flexoid tubing for mine ventilating purposes. D. W. Marshall was in charge.

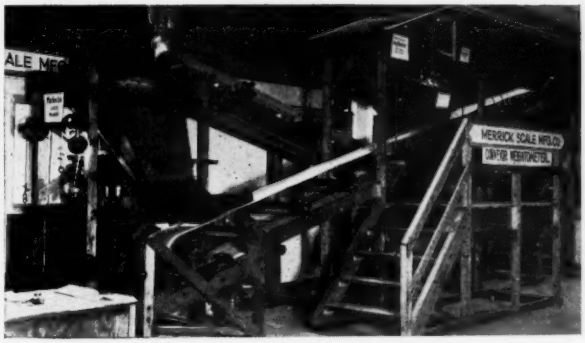
W. S. TYLER CO., Cleveland, exhibited its Hummer electric vibrating screen, a line of woven-wire screens, as well as its testing sieves and Rotap screen shakers. A. E. Reed and W. A. Brown were in charge.

OXWELD ACETYLENE CO., New York, exhibited oxwelding and cutting apparatus. A practical demonstration was made with cast-iron billets. The company has offices in Chicago and

The Hill Clutch Co.



Buckeye Blower Co.



Merrick Scale Mfg. Co.

Colorado State School of Mines

San Francisco. J. V. Upton, Cleveland, was in charge. In attendance were C. E. Ziesel and G. W. Hetterick, Chicago; Z. T. Davis and H. H. Griffith, New York, and F. W. Tucker, Parkersburg, W. Va.

WATT MINING CAR WHEEL CO., Barnesville, Ohio, exhibited a special steel and wood mining car. It manufactures all types of cars and trucks. W. C. Wilson, sales manager, and R. L. Edge were in charge.

PENNSYLVANIA CRUSHER CO., Philadelphia, exhibited a hammer crusher and a single-roll coal crusher. The crusher had a steel plat-

shown. H. L. Coats, sales manager, in charge; J. D. Fitzgerald, Ohio representative.

MANCHA STORAGE BATTERY LOCOMOTIVE CO., St. Louis, showed one of its double-chain drive, revolving battery box locomotives. W. F. Exner, advertising manager, in charge; F. R. Mancha, president; H. S. Schaver, treasurer, and L. P. Standinger, chief engineer.

C. O. BARTLETT & SNOW CO., Cleveland, showed its roll crushers and complete line of conveying equipment. It also manufactures driers, chains, gears and buckets. S. Getz, G. A. Parker and H. L. McKinnon.

Buffalo sales; L. L. Lacey, Columbus sales, and W. H. Wickens, Montgomery, W. Va., sales.

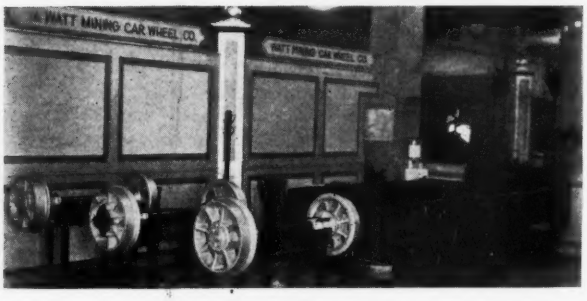
AMERICAN STEEL AND WIRE CO., Chicago, exhibited wire rope and electrical cable. A. T. Merriman, Cleveland sales, was in charge.

MARCHANT CALCULATING MACHINE CO., Oakland, Calif., exhibited its new keyboard calculating machines. The new Marchant takes the drudgery out of figures, eliminates mistakes and is readily adaptable to various uses. J. W. Justus, Cleveland sales manager, was in charge.

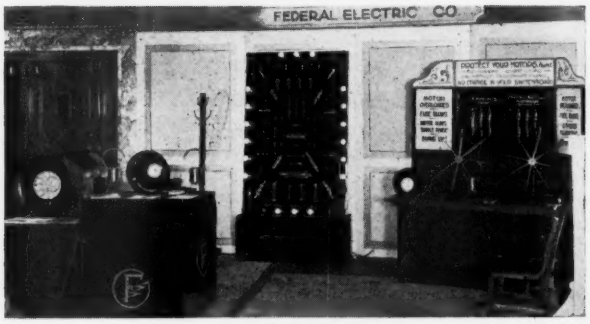
LUDLOW SAYLOR WIRE CO., St. Louis,

The W. S. Tyler Co.

Keystone Lubricating Co.



Watt Mining Car Wheel Co.



Federal Electric Co.

American Brake Shoe and Foundry Co.—Southern Wheel Co.

Ludlow Saylor Wire Co.

form over it equipped with a motor-driven chain hoist manufactured by the Motorbloc Corp., Summerdale, Philadelphia. The bloc is operated by a trigger and raises or lowers the casing of the hammer mill, making accessible repairs to the hammer. The Motorbloc is a motor-driven chain hoist, weighs 148 lb. and has one-ton lifting capacity. H. M. Hallet, Pittsburgh manager, in charge; J. B. Clark, New York; W. C. Briggs, general manager Motorbloc Corp.

GEORGE D. WHITCOMB CO., Rochelle, Ill., exhibited the Whitcomb worm-drive storage-battery locomotive; its gear-drive gasoline locomotive, a sectional working model of the worm drive. S. S. Swasey, assistant to the president, in charge; J. L. Smith, Columbus, manager, and F. D. Quinn, Pittsburgh, manager.

FLEXIBLE STEEL LACING CO., Chicago, exhibited alligator steel belt lacing and gave a practical demonstration of its endurance. The Flexoid guard for electric light bulbs was also

BOCK ROLLER BEARING CO., Cleveland, exhibited a tapered roller bearing adapted to carry radial and thrust loads for use in all machinery. G. E. Kent, manager of industrial sales, was in charge.

SOUTHERN WHEEL CO., St. Louis, exhibited hollow axle mine and quarry car trucks and chilled-iron car wheels. In conjunction with this exhibit the American Brake Shoe and Foundry Co. exhibited brake shoes for mine and industrial locomotives. W. C. Doering, vice-president, in charge; F. L. Collier, Birmingham representative, and F. K. Galby, sales engineer, American Brake Shoe and Foundry Co.

KEYSTONE LUBRICATING CO., Philadelphia, exhibited the Keystone lubricating system and its special lubricants. G. W. Hall, Chicago manager; H. A. Busby, president; A. T. Lowry, Ohio manager; Peter Cassidy, Chicago sales engineer; N. B. Urquhard, Denver representative; Oliver Schaur, Pittsburgh sales; H. W. Allen,

exhibited double-crimped woven wire screens. Samples of every size were shown. F. W. Unger, Chicago manager, in charge; E. M. West, Salt Lake City; J. E. Robertson, El Paso, Tex.

COLORADO STATE SCHOOL OF MINES, Golden, Colo., exhibited a laboratory oil shale distillation apparatus. Dr. Victor C. Alderson, president, in charge.

HERCULES POWDER CO., Wilmington, Del., exhibited its dynamite, flotation oils and blasting accessories. N. S. Greensfelder, advertising manager, in charge; C. C. Jerou, sales manager; W. B. Lyons, Pittsburgh; M. P. Botsford, Duluth; W. O. Turck, Cleveland, and H. T. Stander.

E. I. DU PONT DE NEMOURS CO., Wilmington, exhibited its explosive and blasting equipment and the Ensign-Bickford and National Fuse and Powder Co. fuses. A new blasting machine, compound wound instead of series wound, was shown for the first time. Charles S. Hunter, un-

derground technical expert, in charge; S. C. Jones, H. M. Kinloch, E. T. Lednum and F. W. Hukill.

J. A. ROEBLING'S SONS CO., Trenton, N. J., had an attractive exhibit, with specimens of wire rope, cables and accessories. R. R. Newell, Cleveland manager, in charge; William Gehrman, assistant.

FATE-ROOT-HEATH CO., Plymouth, Ohio, showed two gasoline locomotives of four and seven-ton capacity. The latter is a gear drive and was shown for the first time. H. R. Sykes, sales manager, in charge; W. O. Ritter and G. G. Stein.

MORSE CHAIN CO., Ithaca, N. Y., exhibited its chain drives and had a model to show the workings of the Morse roller joint. It consists of a slotted disc by which the spectator is enabled to see the joint. The disc revolves at high speed alongside the chain and through the single slot the cushioning of the joint could be seen. D. I. Wheeler, Ohio manager, and E. L. Saunders, advertising manager.

BROWN HOISTING MACHINERY CO., Cleveland, exhibited its new belt conveyor idlers equipped with Timken roller bearings and alemite lubrication, drop-forged link conveyor chains, conveyor feeders, malleable iron chains, apron conveyors and all types of screens. G. F. Clemo, advertising manager, in charge; D. H. Morgan and E. P. Sawhitt.

A. LESCHEN & SONS ROPE CO., St. Louis, exhibited a model two-bucket gravity system of mineral removal from a shaft to a tipple below, and full-size model of the friction grip used on the continuous system. W. C. Richards, assistant chief engineer, in charge.

B. F. GOODRICH RUBBER CO., Akron, Ohio, showed rubber in its various stages from the tree to the finished product. H. B. Houston and S. N. Potter of the mechanical department.

HATFIELD-PENFIELD CO., Bucyrus, Ohio, were represented by Arthur Whitcraft, manager of the manganese steel department, and Edgar N. Whitcraft, who explained the merits of this steel for all equipment parts having to undergo hard service. It also manufactures the American gasoline locomotive.

HAZARD MFG. CO., Wilkes-Barre, Pa., exhibited a line of electrical cable and wire rope. T. A. Keefe, Pittsburgh manager; L. C. Beven, assistant general manager, and H. R. Snyder, sales engineer.

NATIONAL REFINING CO., Cleveland, exhibited the Enarco brand of lubricating oils and greases for car wheels, transmission machinery and various other equipment. R. P. Baggies, manager mine lubrication sales, in charge.

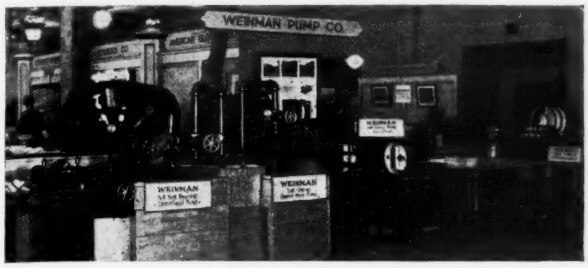
GOODMAN MFG. CO., Chicago, exhibited its electric locomotives equipped with improved equalizer bars which improves the effective draw-bar pull and decreases the tendency for locomotive derailing. It manufactures a complete line of storage battery and trolley locomotives. A. F. Hughes, sales manager, in charge.

ELECTRIC VACUUM CLEANER CO., Cleveland, showed a small portable machine operated as a suction or blowing device for cleaning motors, generators, switchboards, etc., and attached to any electric light socket; it weighs 6 lb. H. P. Lipps, sales representative, in charge.

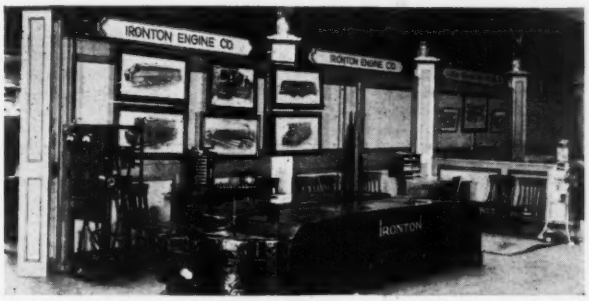
UPSON-WALTON CO., Cleveland, exhibited wire rope, cordage and general accessories. H. R. Lippert, sales promotion manager, in charge; N. R. Thayer.

OTTUMWA BOX CAR LOADER CO., Ottumwa, Iowa, showed moving pictures and a working model of the Ottumwa box car loader. Photographs were shown of the new flexible portable conveyor for carrying logged material from warehouse or packing machines to box cars. Henry Phillips, president, and H. A. Phillips in charge.

AUSTIN POWDER CO., Cleveland, exhibited



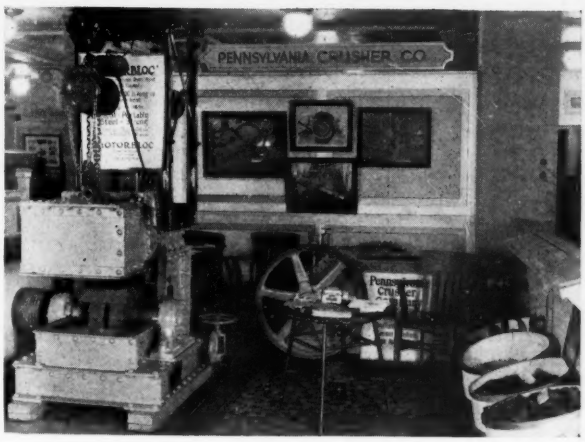
Weinman Pump Co.



Ironton Engine Co.

Geo. D. Whitcomb Co.

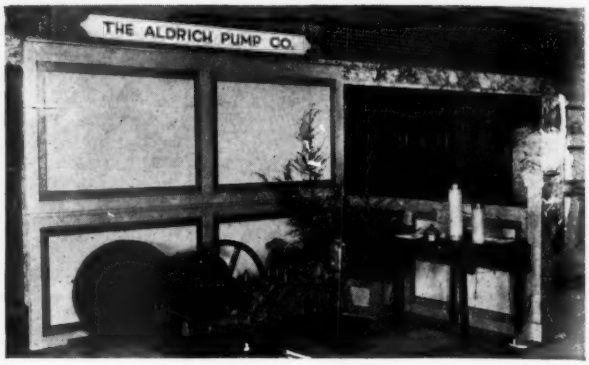
Stearns Conveyor Co.



The Pennsylvania Crusher Co.

C. O. Bartlett & Snow Co.

Flexible Steel Lacing Co.



The Aldrich Pump Co.

its black blasting powder suitable for some gypsum mines; dynamite and blasting accessories. Mr. Alexander, secretary, in charge.

ATLAS CAR & MFG. CO., Cleveland, showed its new gasoline locomotive for quarry work and several types of storage battery and trolley locomotives. R. S. Richards, sales engineer; E. W. Scheelentrager, and S. A. Williams.

RAILWAY AND INDUSTRIAL ENGINEER CO., Greensburg, Pa., showed a working model of the Harrington rocking cableway, a device for handling a large area of ground storage. Mr. Harrington in charge.

FULTON PIT CAR CO., Canal Fulton, Ohio, showed wooden and steel pit cars for general mine and quarry work. J. V. Dugan, H. N. Myers, C. E. Gainey and J. V. Dugan, Jr.

LUNKENHEIMER CO., Cincinnati, exhibited valves, packing, lubricating devices, nozzles, steam gages, etc.

KOEHRING CO., Milwaukee, exhibited a Dandie concrete mixture and also large photographs of its new heavy-duty crane excavator. K. H. Talbot, Western field service manager; W. E. Hughes, E. H. Lichtenberg, G. J. Diamond, C. L. Smith.

H. D. GANUNG, Syracuse, N. Y., exhibited the Smiley car mover bar, a patented device with two spur spools which grip edge of rail; a practical demonstration was given.

ALLIS-CHALMERS MFG. CO., Milwaukee, was represented by an exhibit showing a rack of pictures of installations of Allis-Chalmers equipment.

EASTON CAR AND MFG. CO., Easton, Pa. President F. V. Farrell was in charge of his exhibit, showing types of quarry cars manufactured by this company.

CLEVELAND ROCK DRILL CO., Cleveland, exhibited its new type air-hammer, suitable for quarry work, as well as a complete line of drifters, sinkers, stopes and augers. G. H. Hall, secretary and sales manager; G. M. Nell, D. C. Carner, D. J. Hafford and E. L. Oldham.

DRAVO-DOYLE CO., Pittsburgh, exhibited equipment manufactured by the companies it represents, the Cleveland Worm and Gear Co., De Laval Steam Turbine Co., American Steam Pump Co., Union Iron Works, Lambert Hoisting Engine Co., and the Erie Engine Works. W. K. Fitch, district manager, in charge.

NEW YORK BELTING AND PACKING CO., New York, exhibited its new conveyor belting built with a breaker strip composed of a woven fabric embedded in the rubber coating which gives the belt a tensile strength of 4000 lb. and a friction strength of 40 to 45 lb. J. H. Lane, advertising manager, in charge; F. B. Fitzgerald.

JEFFERY MFG. CO., Columbus, exhibited its electric locomotives with drop forgings instead of castings; ventilating equipment, and other Jeffery products. R. R. Dunlop, C. H. Trick and J. S. Dierdorff.

WELLMAN-SEAVER-MORGAN CO., Cleveland, exhibited a working model of its gravity car dumper, operating without power, a cutaway model of the gasoline or kerosene engine, and motion pictures of interesting installations of equipment.

How We Maintained Winter Operations

NO ONE questions the desirability of producing aggregates during the winter if there is a profitable market and if mechanical conditions do not prevent. The following by Cud Blye, of L. L. Blye, Omaha, in a recent issue of *The Contractor*, shows how the usual difficulties were overcome in one case:

In the territory in which we operate it is impossible to carry on our ordinary construction operations during the winter, and usually we content outselves with carrying over a nucleus organization, frequently having nothing whatever for them to do, but paying them merely to hold them.

Last winter, however, we found an opportunity to keep quite an organization going, including the labor class. We had a contract in Allen county, Kansas (still uncompleted), and for this contract during the winter months we operated a stone quarry and got out all our crushed rock requirements.

From a financing point of view, this was a practical thing to do, because our contract provides estimates on material, and the burden to us of getting the rock out during the winter was not too great, because we were paid by the county 90 per cent of an estimated cost on all rock produced by us during that time.

Such an operation would not be possible, or rather would not be practicable from a financial point of view in Nebraska on municipal work, because of the fact that estimates are not allowed on materials delivered at the jobs. Otherwise, for specifications calling for crushed rock, contractors might occupy themselves during the winter by getting out their rock requirements, or could purchase their rock requirements for delivery then, so as to keep the quarry operating.

In some localities sand and gravel are used instead of sand and crushed rock. It would be difficult to have deliveries made of gravel during the winter because of the necessity for the use of water in the cleaning and grading operations.

On the subject of cement it would be rather difficult to overcome present conditions. In the first place, in our particular territory cement prices are established for a particular contract at the time the contract is let. Ordinarily contracts are not let until the springtime. Even if they were, and the cement prices could be fixed, or the cement companies guarantee to reduce their prices with the market, the big problems of storage at the job, because of the risk that the contractor would take on deterioration, and because of the large cost of building storage bins, it would be impracticable to handle cement requirements during the winter for spring consumption.

So far, as noted, the only winter work we have been able to handle on an economical basis has been crushed rock, the quarry operations being conducted by ourselves, and only under the contract condition that estimates shall be given for material delivered on the job.

RUDYARD KIPLING may, or may not, have taken a mean slam at us Americans, but he sure has released a lot of wisdom in his time. Here's some:

I keep six honest serving men—
They taught me all I knew—
Their names are What, and Why, and When,
And How and Where, and Who.

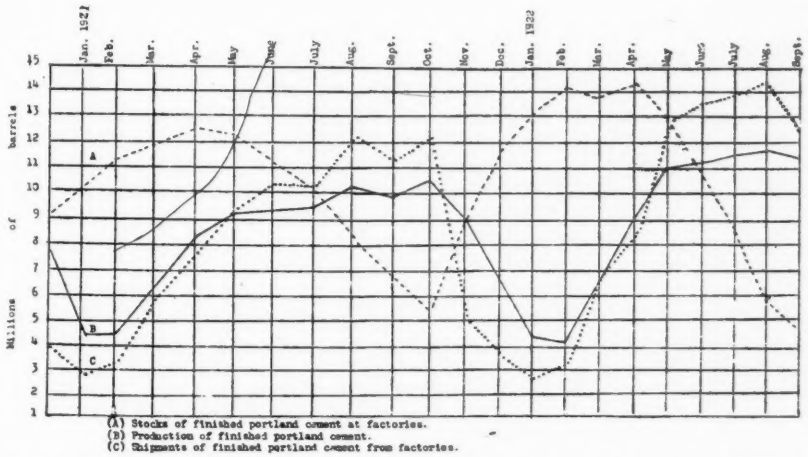
September's Portland Cement Output

THE statistics shown in the following table, prepared under the direction of G. F. Loughlin, of the United States Geological Survey, are based mainly on reports of producers of portland cement but in part on estimates. The use of estimates was made necessary by the lack of returns from three producers.

PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT IN SEPTEMBER, 1922, AND PRECEDING MONTHS

Month	Production (barrels) 1921	Production (barrels) 1922	Shipments (barrels) 1921	Shipments (barrels) 1922	Stocks at end of month (barrels) 1921	Stocks at end of month (barrels) 1922
January	4,098,000	*4,291,000	2,539,000	*2,931,000	10,300,000	*13,316,000
February	4,379,000	4,278,000	3,331,000	3,285,000	11,400,000	*14,142,000
March	6,763,000	6,685,000	6,221,000	7,002,000	12,000,000	*13,848,000
First quarter	15,240,000	15,254,000	12,091,000	13,218,000	.....	.....
April	8,651,000	9,243,000	7,919,000	8,592,000	12,600,000	*14,470,000
May	9,281,000	11,176,000	9,488,000	12,749,000	12,450,000	*12,893,000
June	9,296,000	11,245,000	10,577,000	13,470,000	11,150,000	*10,718,000
Second quarter	27,228,000	31,664,000	27,984,000	34,811,000	.....	.....
July	9,568,000	11,557,000	10,301,000	13,850,000	10,414,000	*8,433,000
August	10,244,000	11,664,000	12,340,000	14,361,000	8,280,000	*5,746,000
September	10,027,000	11,424,000	11,329,000	12,444,000	6,953,000	4,726,000
Third quarter	29,839,000	.....	33,970,000	.....	.....	.....
October	10,506,000	.....	12,114,000	.....	5,348,000	.....
November	8,921,000	.....	5,195,000	.....	9,091,000	.....
December	6,559,000	.....	3,697,000	.....	11,938,000	.....
Fourth quarter	25,986,000	.....	21,006,000	.....	.....	.....
	98,293,000	.....	95,051,000	.....	.....	.....

* Revised.



Monthly fluctuations in production, shipments, and stocks of finished portland cement

Stocks of clinkers, or unground cement, at the mills at the end of September amounted to about 2,338,000 bbl. compared with 2,766,000 bbl. (revised) at the beginning of the month.

The Bureau of Foreign and Domestic Commerce reports that the imports of hydraulic cement in August amounted to 56,757 bbl., valued at $120,136. The total imports in 1921 amounted to 122,317, valued at $388,828. The imports in August were, from Sweden, 42,376 bbl.; Denmark, 6,116 bbl.; Canada, 5,958 bbl.; Belgium, 2,061 bbl.; Japan, 229 bbl., and Mexico, 17 bbl. The imports were received in the following districts: North Carolina, 42,262 bbl.; Porto Rico, 6,116 bbl.; Michigan, 3,171 bbl.; Washington, 2,757 bbl.; San Francisco, 2,175 bbl.; Hawaii, 229 bbl.; Vermont, 27 bbl.; San Antonio, 17 bbl; and Maine and New Hampshire, 3 bbl.

The exports of hydraulic cement in August were 105,156 bbl., valued at $294,737; of this total 102,979 bbl., valued at $281,709 was portland cement, which was sent to Cuba, 48,670 bbl.; to the other West Indies, 6,426 bbl.; to South America, 26,290 bbl.; to Central America, 12,493 bbl.; Mexico, 7,814 bbl.; Canada, 946 bbl.; and to other countries, 340 bbl. The total exports of hydraulic cement in 1921 were 1,181,014 bbl., valued at $4,276,986.

Belgians and Germans Dominate European Cement Market

BELGIAN and German cement makers have succeeded through the policy of price cutting in almost completely arresting exportation of the French product in the last three months, according to reports received by the Iron and Steel Division of the Department of Commerce. The factories at Boulogne-sur-Mer, France, are capable of producing 600,000 tons annually or about three-fifths of the total French production. Conditions in this region are typical of the situation through the entire industry. It is estimated that the cement industry during the last week of July was working at about 80 per cent of normal, whereas the first weeks of the month it was only working at 70 per cent.

French exporters are still shipping a small quantity of cement which they are content to sell at the cost of production. The causes for the differences in prices include the application of the French eight-hour day law, the high freight charges and the high cost of coal.

Bulk Cement Deterioration Less Than in Bags

DETERIORATION of cement stored in bulk is less than in bags, owing to the smaller area exposed, according to the U. S. Bureau of Mines. The conclusion is the result of an investigation to determine the cause of deterioration of portland cement during storage and transportation.

Hydration takes place only at the exposed surface, and the bulk of the cement is unaffected. Cement transported in bulk must be shipped in a tight, closed car, and must be protected from moisture during loading, shipping and unloading, preferably it should be used immediately after unloading at the point of destination. This practice is now followed by several manufacturers and where conditions are suitable it is becoming more common as its advantages are seen.

Brooker to Head Traffic Bureau

EDWIN BROOKER, the well-known rate expert, will open a traffic bureau in Washington.

Mr. Brooker for more than a year was the traffic representative of the National Association of Sand and Gravel Producers. His masterly handling of the traffic problems of the association won for him a fine reputation as a traffic expert. He carries with him to his wider field of endeavor the best wishes of our industry.

OH, the crying out loud of lime! Now comes Doctor Brady with his announcement that we-all should have "at least 3 pounds of lime in our bones—drink a quart of milk daily and we'll get the lime." Does the National Lime Association know of a more attractive method than imbibing a Holstein cocktail or a creme de Jersey?

This Plant Does Not Worry Over Car Shortages

The Meshberger Brothers, Linn Grove, Ind., have a limestone plant which is six miles away from the railroad. Therefore, teams and trucks solve the hauling problem. There is also some homemade equipment installed that will prove very interesting

By JOSEPH K. COSTELLO

A CAR SHORTAGE, actual or threatened, doesn't worry either of the Meshberger Brothers, whose plant at Linn Grove, Ind., situated about six miles from the nearest railroad, at Berne, turns out 500 tons of commercial crushed limestone each day. At present their output is being hauled to the job in forty 2-yd. wagons and thirteen 5-ton highway trucks.

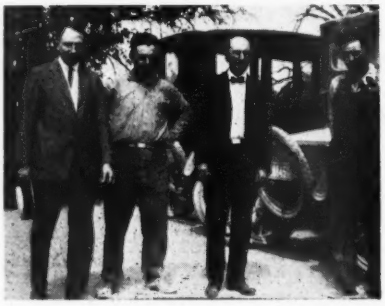
There are approximately 100 acres of limestone in the deposit worked by this company. State tests have proved the rock to be better than the average Indiana limestone. It is covered with an average of 3 ft. of clay which is removed by a one-man Bay City excavator.

The quarry is worked in a semicircle about 500 ft. long and with a 21-ft. face. An Armstrong drill does the blast hole drilling.

An old model, electrically driven Fairbanks shovel with a drum-type wheel which makes it surprisingly mobile, handles the rock in the quarry. The cars were made from old material after a type in general use, due to the ingenuity of Frank Runyon, who designed and built the plant. A Plymouth locomotive hauls the cars 700 ft. to the bottom of the hoists.

A 20-ton Byers hoist, driven by belt from the main shaft raises the cars above the level of the crusher into which they automatically dump as a pair of rails, set slantwise, engage a crosspiece on the rear gate and lift it. This Gate No. 5 main crusher reduces the 8-in. cube run-of-quarry rock to 4 in.

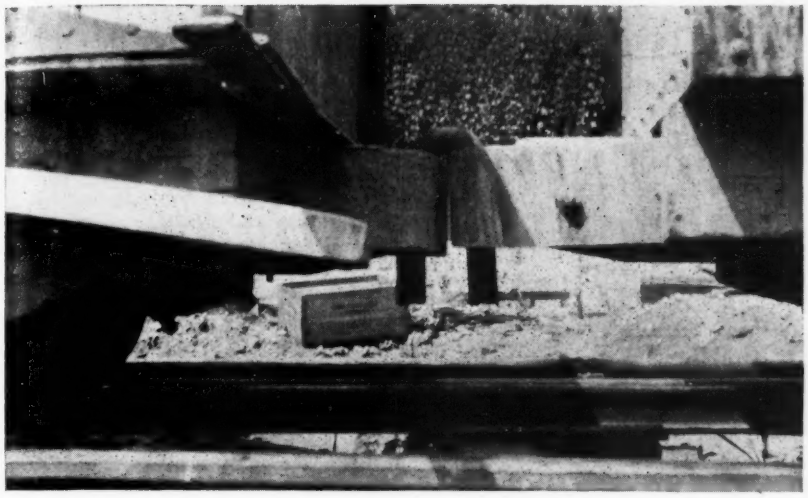
The plant of the Meshberger Brothers at Linn Grove, Ind. It looks busy, doesn't it?



Left to right—Harry Meshberger and Oscar Meshberger, owners; Levi Baumgartner, bookkeeper; Carlton Sales, in charge of trucks

An elevator, built up of Jeffrey buckets attached to a five-ply conveyor belt, elevates the stone 45 ft. from the discharge of the crusher to the screen, an Allis-Chalmers rotary, 40 in. diameter and 12 ft. long, driven at 13 r.p.m. separates three sizes of stone, which are delivered through chutes directly to bins; and the rejects, averaging 25 per cent of the total output of the crusher, are delivered by gravity to a No. 3 Allis-Chalmers crusher which reduces this rock to proper size when it is returned by gravity to the main elevator.

A Jeffrey limestone pulverizer, driven by a 40-hp. induction motor, is located



Here is an inexpensive but effective car coupling

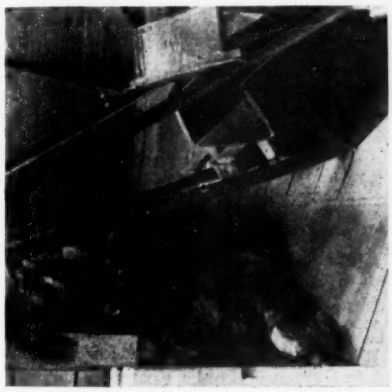
in an adjoining building for pulverizing agricultural stone; the rock is fed to it from the storage bins. All the machinery in the main plant is driven off the main shaft, which in turn is driven by a 75-hp. 440-volt slip-ring induction motor.

A 100-hp. friction clutch, in the drive shaft at the main drive pulley, acts as a safety valve in case the mixer should choke on a piece of iron or hard rock. The quarry is kept dry by a Morse 6-in. suction pump driven by a Fairbanks-Morse 20-hp. induction motor.

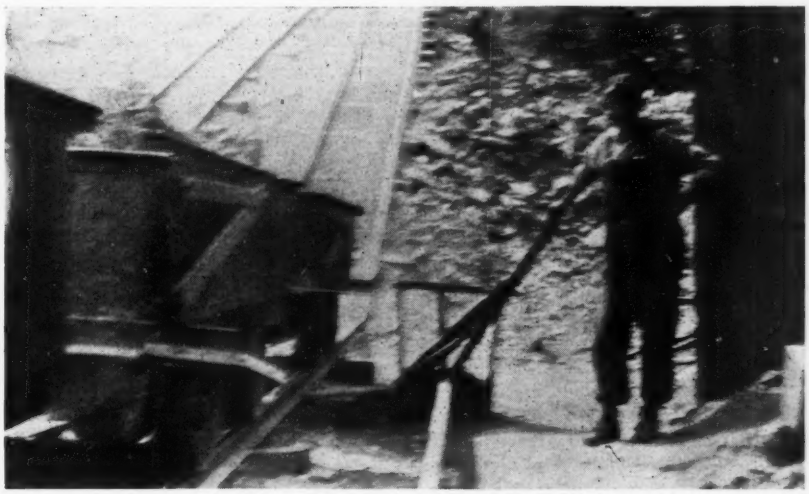
Wagons and trucks can be loaded directly from the overhead bin. Fluctuating demands on the plant have caused the owners to resort to ground storage to attain a uniform delivery capacity. The Bay City excavator has proved extremely handy here as it can be easily transferred from the removal of the overburden to that of handling the material in the ground storage at low operating cost.

The coupling for quarry cars, shown in one of the illustrations, is an example of a workable contrivance that is easily and cheaply made. The switch throws are also examples of the ingenious use of scrap materials to increase the efficiency of the plant. A handle in a convenient place throws the switch through the agency of pipe shafts similar to the interlockers on a railroad. All wires and power lines are kept off the ground on neat tripods constructed of light timbers.

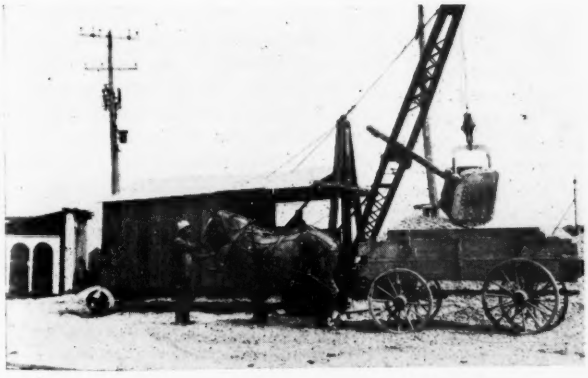
SOME deep stuff: The short skirt is said to be on its last legs. Even the most casual observer now and then sees two perfectly good reasons for its disappearance.

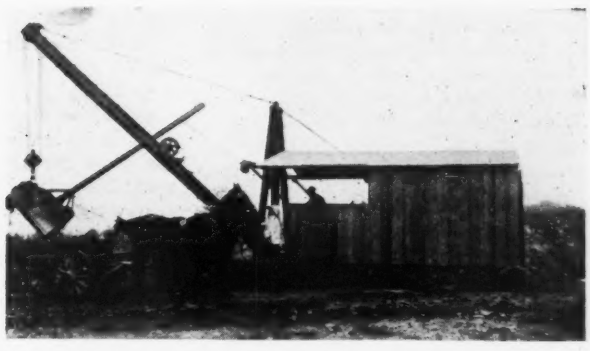


The slanting rails shown dump the car



A convenient method of throwing switches





This excavator is loading from the ground storage and removing the overburden

Need of Research in Cement Industry

NOTHING has served to demonstrate to the portland cement industry the possibilities of increased production efficiency more than the results which have been obtained by the installation of properly designed waste-heat boilers and the power-plant equipment required by such installation, states P. H. Bates, chief of the division of ceramics, Bureau of Standards.

Though it is true that some of the first to attempt the use of such waste-saving devices met with dismal failure, yet those who continued development along these lines, or the others who studied the first failures, have met with such success that now all concede the marked increase in plant efficiency obtained by the use of the waste heat recovered from the rotary kiln. If a plant with but three 150-ft. kilns can generate from the heat formerly wasted by these not only enough power to run the entire plant but sell an unrequired surplus, what more striking example of the possibilities in production efficiency could be desired?

Such results have been obtained by the first intensive study of but one feature of plant equipment. There is reason to believe that the study of all the other features might produce as highly gratifying developments. Hence why not continue the study with the kiln and determine the most efficient length of kiln for any type of raw material and the proper ratio between length and diameter? Kilns now vary from 6 to 12 ft. in diameter and from 60 to 240 ft. in length.

The settling, for the time being, of the fineness requirements in the standard specifications for cement is too recent to have dropped from the memory of many. The discussion of this will be recalled to have hinged upon the ability of certain of the common types of grinding mills to produce the fineness of product asked for by many and upon the cost of such extra grinding by any type of mill.

It served to bring out strikingly the fact that the type of mill used was largely a matter of personal preference, without any basis of actual data of the efficiency of the various types used. Here again the question is not one of variety alone but also of size. What should be the ratio of length to diameter of tube mills, or what should be the diameter of the various types of ring mills for the greatest efficiency?

There can be no doubt that the most important factor toward increasing production efficiency in the portland cement industry would be research, especially along the lines of operation of the mechanical plant and leading toward the standardization of plant equipment. This is suggested without even considering the need of research along chemical lines such as might lead to certain changes in composition or raw material as would reduce the clinkering temperature or the need for the usual degree of fineness of the raw materials.

It is suggested also without regard to the desirability of research to determine whether portland cement as now made is of the proper composition for all purposes, or without regard to investigations which might lead toward such radical changes in production procedure as recently brought forward in France with the appearance of the "fused cements."

Mechanical research is the feature which can bring in the shortest time to this huge chemical industry—the manufacture of portland cement—the greatest increase in production efficiency. While it is to the credit of the chemists and chemical engineers that this industry has grown from nothing to a value of annual production of close to $225,000,000 in somewhat less than half a century, yet for this industry to gain the efficiency of production that will be demanded of it to bring it to the level of the other chemical industries, it will be necessary for the chemists and chemical engineers to see that research is directed along these lines.

Are Cement Prices Too High?

FRANKNESS is, after all, the best approach to controversial subjects. For several years there has been much question as to the reasonableness of cement prices. In particular, a contractors' group, under the leadership of the A. G. C., has declared that they have been too high.

Now comes Mr. Burch, of the Atlas Portland Cement Co., and in a frank inquiry lays the pertinent facts on the table. The exposition is satisfying. He studies prices from three different angles: the earnings of the cement companies, the cost of production, and the comparison of prices of cement with those of other building materials, Nor does he dodge in his study of earnings. He plots the returns of the two most profitable eastern companies and of the two worst losers. In giving details of cost of production he shows profit, too.

Of course, everyone knows that there is great latitude in what different people might include in costs, with the consequent effect on profit, but it must be remembered that accounts are now under federal income-tax scrutiny and the percentages written off for depreciation and amortization definitely set. In other words, today's industrial figures are not subject to the variation of personal opinion as they were 10 years ago. Mr. Burch's frankness should have more frequent imitation. The public's confidence is the best assurance of business stability and freedom from public persecution. Confidence can be won in large part through such frankness as that displayed in Mr. Burch's inquiry.—*Engineering News-Record.*

Cheaper Explosives?

THE United States Bureau of Mines has recently made tests which show that certain types of military explosives can be used effectively for industrial blasting purposes. As a result of these tests the War Department has allotted to other government departments several millions of pounds of smokeless powder which were on hand at the close of the World War.

The inventor has pointed out that, when ground to fineness, the smokeless powder can be detonated by a No. 6 detonator. However, the rate of detonation varies with its fineness as measured by sieves of 8 to 80 mesh, which makes it possible, by regulating the grinding and sieving, to prepare explosives of different detonation. It is provided, of course, that this powder shall be packed in cartridges, as is the practice with dynamite.

Information relative to the procuring, handling, packing and, instructions in general, covering the use of smokeless powder, is contained in Serial 2386, and may be obtained from the Bureau of Mines, Washington.

Hard-Surfaced Roads at Least 18 Ft. Wide

A MINIMUM width of 18 ft. for hard-surface roads is recommended by the U. S. Bureau of Public Roads. The maximum width of truck body generally permitted is 8 ft. and 5½ ft. is the ordinary clearance width of automobiles. For trucks at an average speed of 15 miles an hour, this distance should not be less than 1¾ ft. on account of the great width of the rear wheel. Three feet seems to be a minimum safe clearance between bodies. Inasmuch as a certain amount of truck traffic is to be expected on all main country roads, the minimum width of surface should be 18 ft. to provide these clearances when an automobile meets a truck.

Where the frequency with which trucks pass each other becomes a big factor, as in the neighborhood of large cities, the minimum width of pavement should be 20 ft. to provide a clearance of 3½ ft. and a safe distance of wheels from edge of pavement.

Operating Regulations on on Leased Public Lands

OPERATING regulations to govern the methods of mining oil shale, phosphate, sodium, and potash on leased public lands of the United States have just been issued by the Bureau of Mines, which is intrusted with the supervision of such operations.

The regulations provide that it shall be the duty of the supervisor and district mining supervisors to visit from time to time leased lands where operations for the discovery or mining of oil shale, sodium, phosphate, or potash are conducted; to inspect and supervise such operations with a view to preventing waste of mineral products, or damage to formations or other mineral deposits; and to supervise operations and conditions for the promotion of the safety, health, and welfare of workmen. Supervisors will submit recommendations for safeguarding and protecting the lives and health of the employes, the property, the minerals, and the mineral-bearing formations.

The lessee shall prepare such maps as in the judgment of the supervisor are necessary to show the surface boundaries, improvements, and topography, and the geological conditions so far as determined from outcrops, drill holes, prospecting, or mining.

The underground and surface sanitary, welfare, and safety arrangements shall be in accordance with the recommendations of the United States Public Health Service and United States Bureau of Mines. All employes shall be afforded all possible protection to life and health. All mechanical equipment used for the transportation of men shall be of safe design. Adequate shelter holes shall be made, guide rails or fences shall be erected, and warning signs shall be posted at dangerous walks or passages; all moving parts of machinery or belts, when endangering employes or liable to result in injury, shall be adequately guarded. In the mining and milling or treating of the ores or mined products, the employes shall be adequately protected from injurious fumes, acids, dusts, and harmful or dangerous conditions. In mines where siliceous or other harmful dusts are formed, drills shall be of the water-injection type and sprays shall be used to wet down the dust.

Lessees shall maintain for each underground operation sufficient amount of ventilation for such men and animals as may be employed therein.

The lessee shall store, thaw, transport, issue, and use explosives only in the most approved manner and with due regard for the safety and welfare of the employes and protection of property.

Mining operations shall be conducted in a manner to yield the ultimate maximum recovery of the oil shale, phosphate, sodium, or potash, due regard being taken to protect with adequate pillars all shafts, main exits, and passageways, and all beds or mineral deposits overlying the deposit being worked that at a future date may be of economic importance.

The regulations also cover the subjects of fire protection, escape ways, electrical equipment, disposal of waste rock, the submission of core or test hole records, and the application of improved milling methods.

Copies of these operating regulations may be obtained from the Bureau of Mines, Washington.

Five Standard Fall Fertilizers

ANNOUNCING five standard fertilizer formulas which they urge for wheat this fall, soil scientists of the Ohio State University and of the State Experiment Station have taken their first step in an extensive campaign to cut the 57 combinations of fertilizer now offered for sale in Ohio to a list of no more than 12 standard formulas.

For wheat is recommended straight acid phosphate, containing 16 per cent of available phosphoric acid, or better; and any one of the following four mixed fertilizers: 2-16-2, 2-12-2, 3-12-3 and 0-12-4, A 2-16-2 fertilizer analyzes 2 per cent ammonia, 16 per cent phosphoric acid and 2 per cent potash. The other formulas are similarly translated into the terms of the fertilizer tag.

This list was determined on at a recent conference between college and station workers following a survey of opinions among the county agricultural agents and of leading companies which sell goods in the state. The State Farm Bureau Federation, through its Farmers' Commercial Service Co. will restrict co-operative purchase of wheat fertilizer this fall to the standard formulas.

A complete list of recommended fertilizers for all crops grown in the state will be announced later. It is not expected that the total number of recommended mixtures will exceed 12.

Twenty fertilizer companies have assured the college of their approval of the campaign. They agree that 12 mixtures would meet all needs, and that the present multiplicity of brands materially increases both manufacturing and selling costs.

Stone Quarry Accidents in 1921

ACCIDENTS at stone quarries throughout the United States in 1921 resulted in the death of 100 employes and the injury of 10,465 others, according to figures compiled by the Federal Bureau of Mines.

The average number of men employed in quarries was 77,185, who worked a total of 17,987,547 shifts, an average of 233 work days per man. Based upon a standard year of 300 days, the reports show a fatality rate of 2 per 1000 employes and an injury rate of 174.55. For 1920, the corresponding rates were 2.31 killed and 145.51 injured.

Accidents during 1921 were distributed as follows, according to kinds of stone quarried: cement rock, 20 killed and 2233 injured; granite, 18 killed and 940 injured; limestone, 58 killed and 5248 injured; marble, 6 killed and 406 injured; sandstone and bluestone, 3 killed and 374 injured; slate, 4 killed and 385 injured; traprock, 11 killed and 879 injured.

The principal stone-producing states, the number of persons employed and the number of accidents in each were: Pennsylvania, 14,994 employes, 1914 accidents; Ohio, 4570 employes, 726 accidents; Indiana, 4434 employes, 602 accidents; New York, 4357 employes, 827 accidents; Vermont, 4130 employes, 361 accidents; California, 3719 employes, 684 accidents; Illinois, 3241 employes, 515 accidents; and Missouri, 3079 employes, 415 accidents.

Most of the accidents inside the quarries were caused by handling rock at face, flying objects, falls or slides of rock, haulage and machinery. At the outside rock-dressing plants and crushers, the main causes of accidents were flying objects, machinery, falling objects, hand tools, and falls of persons.

Removing Coal Unrest

THERE are approximately 7,000 mines producing coal, or more than 3,000 too many. Demand comes periodically and is thereby intensified. Prices advance and the 7,000 mines are rushed into full operation. The demand is satisfied, prices drop and many mines close. This causes the average bituminous mine to operate on the average of only 215 days in the year and only 170 days last year. It destroys the morale of the miner and decreases his capacity and inclination for work. It periodically encourages the opening, equipping and staffing of more mines to swell the seasonal and unnatural rates of output. Roughly, the coal industry works eight months and then closes down four. If it wasn't for these 3,000 surplus mines and 150,000 extra miners the soft coal industry could operate continuously on a sound, economic basis like other industries.—*J. Barron Nealey in World's Work.*

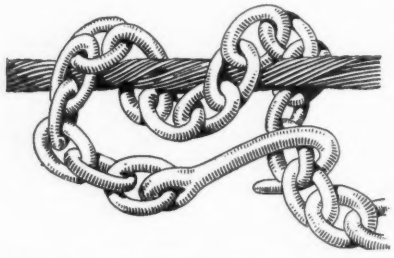
Hints and Helps for Superintendents

Old Boiler for Air Receiver

THE Mid-west Crushed Stone Quarries Co., Greencastle, Ind., is employing a scrapped horizontal boiler by using it as an air receiver. The tubes were rolled, all the steam connections were plugged, and it was then connected direct to the compressor. No more fittings or equipment, than those necessary to connect a standard type receiver were used, and the boiler is substituting very satisfactorily as a receiver.

Chain Grip for Rope Haulage

IN ROPE haulage with the ordinary clip on the lever or screw principle, when ascending a slope, there is danger that a



This chain grip is employed for attaching a car to a haulage rope

full car will occasionally break away and slip down the rope when nearing the top of a steep incline, says J. Chilton, in the *Journal* of the Chemical, Metallurgical and Mining Society of South Africa. This is because the full rope near the bank head is of slightly less diameter than the same rope at the bottom of the slope. Consequently most rope clips have to be tightened when under this heavy strain. This entails extra expense in labor and often damages the rope. To avoid these dangers and disadvantages it was decided to put in the chain grip attachment. This method of fastening is probably the simplest that could be employed.

Neither with the full nor with the empty car has trouble been had due to slipping. The chains are attached to the front of the full car, and to the back of the empty. They are about 10 ft. in length with ⅜-in. links, and a hook at each end. One hook is attached to the drawbar of the truck, then the chain is wound a few times round the rope and hooked back upon itself, as shown in the accompanying illustration. One of the chief merits is that the pull is on the drawbar, low down, and in the center of the road, thus avoiding the side wear on the wheels, so marked a feature in some forms of endless-rope haulages. The grip is also self-tightening and does not damage the rope.

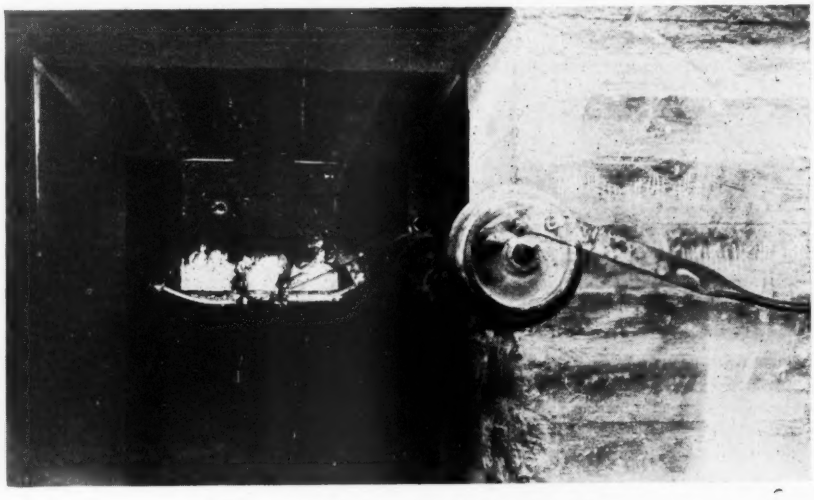
When the chain grip was under consideration it was recognized that there might be some trouble from twisting the rope if great care were not exercised in splicing the ends, but this drawback was successfully overcome, and after the first few cars were drawn up there was no further trouble from this source. Although there are two curves in the haulage, the chains and hooks pass round the sheaves without difficulty. The breaking strain of the chain is about three tons, and should a truck become derailed the chain breaks, thus avoiding damage to the rope. The diameter of the rope is ⅞-in., and it travels over the tracks at the rate of 2 m. p. h. The attaching and detaching of the trucks at the three landings is done without interfering with the speed of the rope.

Another Use for Old Car Wheels

THE installation of a lever for operating a duplex bin-gate where the side room is limited is sometimes difficult.

When the problem confronted D. S. Hunkins of the Peerless White Lime Co., Ste. Genevieve, Mo., it occurred to him to make use of scrapped equipment in installing the levers. The accompanying illustration shows how this was accomplished. Three small quarry-car wheels were mounted on a shaft, and the shaft mounted on old bearings. They were then secured to the concrete pillars parallel to the gate. To each of the two inner wheels were bolted two bars 2 in. wide and ⅝ in. thick, which extended to each door of the gate. To the third or outer wheel was attached a bar or lever of sufficient length to insure proper leverage. Thus, by pushing the lever, the wheels and shaft are turned, and the bars which extend from the wheels to the doors of the gate, work horizontally, one pushing open one door, the second pulling open the other.

This device is made up entirely of equipment of no value for the purpose it was originally designed. An advantage it has over other types lies in the fact that it permits the operator of the gate to work at a greater distance from the gate, avoiding the dust and gases.



One way of operating a duplex bin gate

Efficiently Operated Feeder

THE feeder at the outlet of a receiving hopper is a unit of a sand and gravel plant which requires much consideration. An automatic feeder, of course, is preferable, in that it actually eliminates a man at the gate and insures the proper feeding. However, there are plants which, because of their original design, prohibit the installation of such a feeder.

In cases of this nature the question arises, "What is the best type of gate control?"

A type which is worthy of consideration is controlled by a double cable on a drum, and the drum is controlled by a large hand-wheel, which gives a leverage equivalent to that obtained with the old style 12-ft. or 14-ft. lever which required two men to operate. This type of gate control can

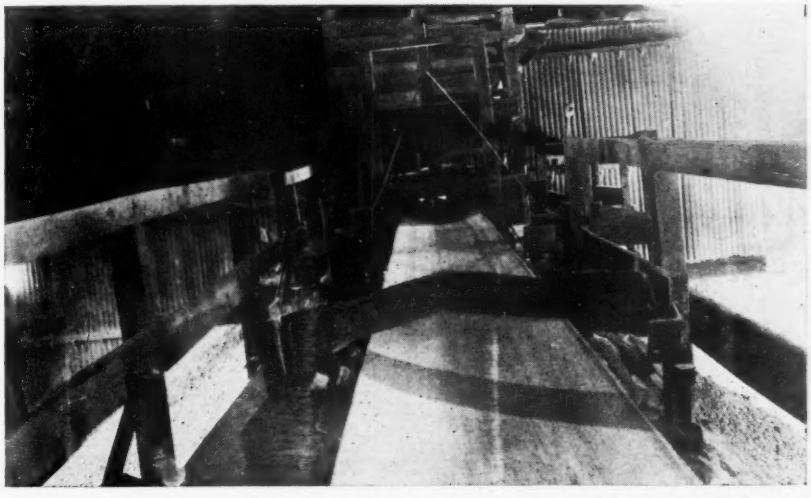
be easily operated with one hand. It is the idea of W. H. Crabbe, superintendent of the Rockdale, Ill., plant of the Chicago Gravel Co.

Making a Conveyor Discharge at Any Desired Point

IN some plants conveyor belts extend over space which it is possible to use as storage, whether it be for limestone screenings, sand, gravel, lime, or other materials.

The accompanying illustration shows how to make use of such space at practically no expense, as the material can be obtained from the scrap-pile, while the time required to install is short.

A piece of heavy sheet iron, three or four in. wide and as long as twice the width of the belt, is bent V-shape. A hole drilled in each end of the V permits it to be bolted to the bottom of a post which supports the railing, and allows it to be raised or lowered as desired. By allowing the V to lay on the belt with the point pointing the opposite direction from which the belt is traveling, the material is forced to leave the belt and is discharged below, where it can be reclaimed by whatever method is most suitable. These devices may be placed at numerous points as required. When so desired, the material may be allowed to pass on to the discharge end of belt by simply raising the V.



The scrap pile furnished the material used to discharge this conveyor at any desired point

Cleaning Boiler Tubes by Sandblast

A EUROPEAN shop is employing an air-impelled sandblast for cleaning boiler tubes which is composed of a length of pipe equipped with a nozzle, linked with a compressed-air line and a supply of sand.

The sand cuts away the scale and polishes the boiler-tube surfaces without causing any damage. The equipment may be used in any boiler which is provided with openings that will permit its entrance. Operable air is required at a pressure ranging from 15 to 30 lb.; the consumption is at the rate of 4000 ft. of free air per minute. This apparatus will show still better results when contending with the far less resistant soot.

This apparatus is said to do the work quickly and economically, and is equally efficacious when attacking either the interior or the exterior fouled boiler-tube surfaces.

Present Conditions in the Slate Industry

MONTHLY Digest No. 3, issued by the National Slate Association states that October 9, the last day of Fire Prevention week, leads one to review all the information presented to the public in what has been the best directed educational drive to safeguard America from fire. As 90 per cent of the fires are due to avoidable causes, too much cannot be said to urge a greater caution and regard for life and property.

Slate in all of its uses has a large demand because of its fireproof characteristics. Since, according to the National Board of Fire Underwriters' reports, losses from fires due to "sparks on roofs" constitutes the seventh largest cause, naturally the careful purchaser of a barn, building, farm or home, makes sure it is protected from the elements by a non-inflammable roof. When reroofing time comes, where less permanent materials than slate have been used, fire losses from sparks on roofs adjacent should cause one to choose a fire-proof material such as slate.

The 1920 average loss "from sparks on roofs" of $8,333,449 would pay for the difference in cost of slate over many cheaper materials on over 100,000 buildings. The reroofing market this year has been exceptional, and slate is coming back to its just share.

While 1922 is a record construction year according to Dodge figures in contracts awarded of over $2,600,000,000 since January, many projects are just reaching a point where the orders are being placed for electrical slate panels, switch bases, switchboards and meter boards of all kinds. The demand for electrical slate will be increasingly stronger in the next few months, so while costs are increasing, prices on slate are firm, advances being registered in certain grades on which concessions from list given by producers last spring to stimulate business have been recalled.

In spite of this reduced production the National Slate Association shows an ample stock of many sizes, thicknesses and varieties of slate. Over 90,000 squares of roofing slate are available. Some 370,000 sq. ft. of blackboard and 235,000 sq. ft. of mill-stock for buildings, sanitary and structural purposes have been prepared to take care of the anticipated next few months' demand in addition to the regular production which is running at the fullest capacity possible considering the scarcity of quarry workers, many of whom were taken from the industry during the war and have not yet migrated back.

August production and shipments of slate by producers reporting ran 31 per cent higher than the same month in 1921, and about the same as 1920. The eight months ending with August show about 10 per cent greater sales of slate than in 1921.

Some delay in delivery of slate and cars at quarries for loading has been experienced on account of freight embargoes, but the railroads serving the slate regions have promised prompt relief in this direction, before it cripples the industry. It is hoped the new Federal Coal Commission will avoid similar conditions in future years.

Users of slate and all materials are urged to place their orders now for needs of the last quarter of 1922.

New Sand and Gravel Plant

IT is the plan of the Mt. Calvary Sand and Gravel Co., Columbus, Ohio, to develop a new sand and gravel operation and build a new plant in Columbus some time next year.

The new plant will have an average daily capacity of 1000 tons, it will cost about $150,000 and will be operated under the present management.

Several tests of deposits at various locations in the city have been taken, but no selection of available location has yet been made. The plant which the company is now operating will continue to operate and will be independent of the new operation

A Mineral Aggregate Screening, Sizing and Washing Expert

ROCK PRODUCTS is glad to be able to announce that production of mineral aggregates—sand, gravel, crushed stone and slag—has at last been sufficiently recognized as a part of the great American mining industry that a well known mining engineer of twenty years' experience has decided to give his whole time to solving operating problems connected with the screening, sizing and cleaning of mineral aggregates.

To many readers Edmund Shaw needs

Edmund Shaw, consulting engineer

no introduction, for his two series of articles in Rock Products on sand and gravel washing, and on silt and clay removal and hydraulic separation have already made his name familiar. Another series of articles on "Screens for Washing Plants" starts in this issue of Rock Products. The first two series of articles are already widely recognized as a real classic in the sand and gravel industry, and we have no doubt that the third series, which is supplementary to the others, will make an equally notable contribution to the scanty literature of sand and gravel plant operation.

Mr. Shaw was educated at the Massachusetts Institute of Technology and for 20 years has specialized in that branch of mining engineering known as "ore dressing." Quarry and gravel plant operators who are familiar with mining terms know that ore dressing includes a long built-up practice and theory in hydraulic separation, screening, cleaning (or refining), and crushing. As Rock Products pointed out several years ago, a tremendous amount of this mining experience can be applied with profit to the every day problems of the sand and gravel operator, and to the washing and screening recovery problems of the quarry operator.

In his 20 years' experience Mr. Shaw has been superintendent of a number of mining plants in the far west and Mexico, and for the past few years has been engineer of the Allen Cone Co., El Paso, Tex. As engineer for this company he has given considerable attention to the hydraulic separation problems of the phosphate industry and more recently to the sand and gravel industry. In his new capacity as consulting engineer he will have no connection with any equipment manufacturer and will devote his whole time to the operating problems of the rock products industry. His new address will be 542 South Dearborn street, Chicago.

Rock Products is also glad to announce that it has retained the services of Mr. Shaw in a consulting and advisory capacity for the bettering of its service to readers and advertisers. Mr. Shaw will consult and advise with the editors and research department staff in answering such questions and problems of readers and advertisers as the staff of Rock Products may find too deep for their own mental resources or experience.

Northwest Engineering Co.'s New Sales Manager

ON OCTOBER 15, C. R. Dodge, well known in the construction and contracting field, became sales manager of the Northwest Engineering Co., Green Bay, Wis., manufacturers of crawler cranes, draglines, shovels, and similar

C. R. Dodge, of the Northwest Engineering Co.

equipment, with general sales office at 28 East Jackson boulevard, Chicago.

That Mr. Dodge is fully qualified to fill the position is made self-evident by a review of his years of intimate contact with the practical problems of the field. From 1910 to 1917 he was in charge of the Milwaukee Concrete Mixer Co.'s business in the East, as well as operating his own organization, handling a general line of contractor's equipment in New York City under the name of C. R. Dodge & Co. In 1917, when the Lakewood Engineering Co. took over the sale of Milwaukee concrete mixers, Mr. Dodge opened the first Lakewood district office in Philadelphia, continuing in that office until 1918. Following this, and until 1920, Mr. Dodge became field sales manager for the Lakewood company, in charge of all district offices and agencies. Since 1920 Mr. Dodge has been Western sales manager for that company.

It was to strengthen its sales organization in order to handle its increased business that Mr. Dodge's services were sought by the Northwest Co. W. W. Mutter, vice-president, who formerly handled the sales organization, is turning his attention to production and special problems.

Need for Trained Highway Engineers

AN OVERNIGHT demand for trained men far in excess of properly qualified applicants has resulted from the rapid growth of the newest of the engineering arts, highway construction, according to the Highway Education Board, Washington. The board's findings of conditions in the new industry, together with a statement showing the needs of the future, are to be placed before the forthcoming national conference, to which the board has invited government and state highway officials, engineers, educators, executives of automotive industries and other interested persons. The conference will be held at Washington, October 26 to 28, inclusive.

Two New Lime Bulletins

FROM the National Lime Association comes two new bulletins, Bulletin 306, of 80 pages, is devoted to "Lime In Construction," and is a comprehensive review of the facts and occurrences of lime in plaster, stucco and concrete. It shows by observation and by test data from quoted authorities, its durability, insulating properties, adequate strength, working qualities and economic advantages. It was written by Tyrrell B. Schertzer, C.E., engineer of the association's eastern bureau.

Bulletin 308, "Lime In Concrete," 24 pages, shows the use of lime as approved by engineers, architects and contractors, in letters that "will challenge the attention of every one interested in concrete."

New Road Tests for Selecting Aggregates

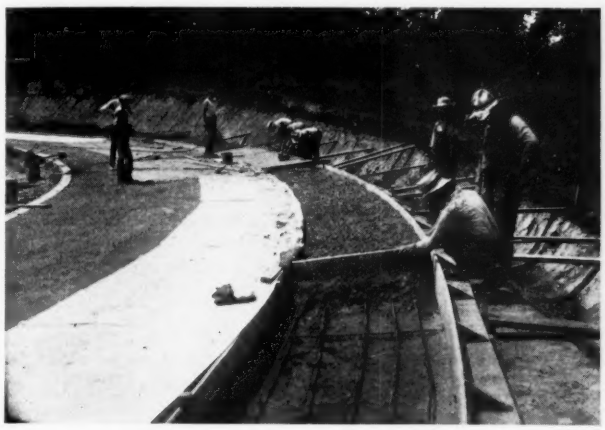
THE Bureau of Public Roads of the United States Department of Agriculture has started extensive road research investigations.

A new portable road-impact machine has been procured and its results are very satisfactory in testing the series of concrete slabs placed earlier in the season. This series consists of 120 slabs ranging in thickness from 4 to 10 in.

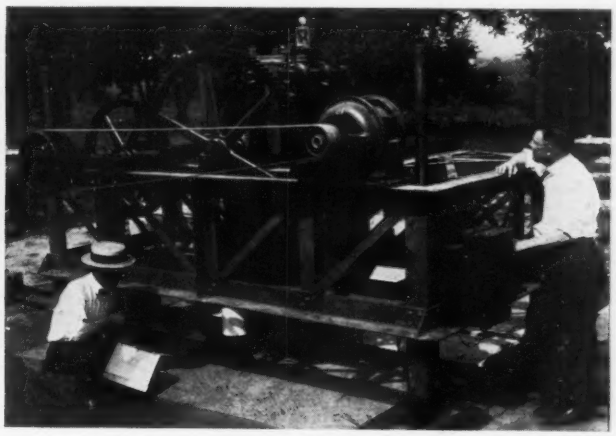
The machine, which is shown in the accompanying illustration, consists of a typical motor truck wheel with a spring and variable weight above it, which can be raised and dropped on a slab from any desired height by use of an electrically driven cam. Recording devices measure the deceleration, deflection, settlement (into sub-grade), permanent set of slab, and the maximum stress at the point where the blow is struck. Information as to the variation of the support given the slab by the sub-grade under a series of varying blows is being obtained.

A circular concrete track upon which tests will be made to determine the cause of waving will soon be ready for the automatically controlled truck traffic. This track when completed will be made up of 61 sections of concrete of various aggregates and mixtures.

Results of this wear test, which will represent modern traffic conditions, will furnish a basis for the consideration of suggested changes in specifications for concrete road aggregates.



How the test track is constructed



This is the impact machine

THE LOS ANGELES aqueduct has the speed and quantity record for a sand and gravel stock pile. Overnight, and in three hours, a cloudburst dumped 5,000,000 cu. yd. of that material over 3000 ft. of aqueduct surface.

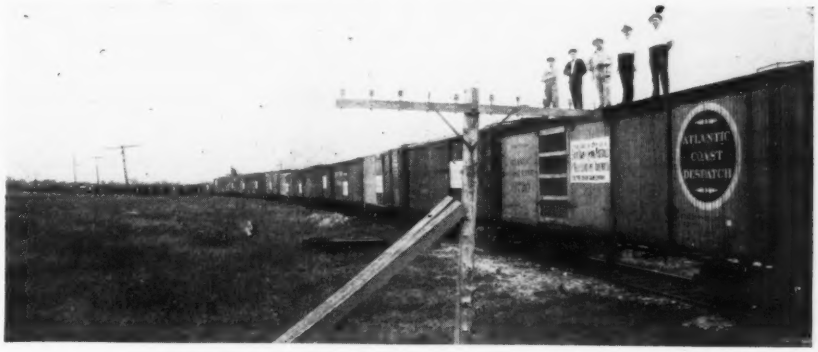
Lime—a Solid Train Load for Canton

IF customers for lime and lime products ordinarily ordered by train load lots, many producers would no doubt increase their operations and probably add substantially to their profits during the 12 months.

A shipment of an entire train load of liming materials to a single consignee isn't an everyday occurrence, but it did happen not long ago when the Kelley Island Lime and Transport Co. shipped to the Canton Grain Co. a solid train of 33 cars of liming materials which will be used for agricultural purposes.

H. F. Herrod and W. L. McIntosh are credited with the sale of this large order. The territory was worked by solicitation from farm to farm. With lime being more widely recognized each season in agricultural circles, no doubt a few years hence a train of this type will not be an unusual sight, but quite an ordinary occurrence.

Other lime producers can take courage that the downward curves of agricultural lime consumption are offset in some instances at least, like this one where intensive selling effort has brought its reward.



Kelley Island's 33 cars of liming material for the Canton Grain Co.

Dr. Bowles Completes Slate Investigation

THE slate inquiry begun by Dr. Oliver Bowles, mineral technologist of the Bureau of Mines has been completed recently.

The study involved visits to almost all working quarries and finishing plants in the country. The purpose was to promote efficiency and waste elimination in the industry and to find uses for unavoidable waste. Several short reports were issued and a final bulletin was submitted for publication.

A most important development made was the establishment of a national slate association for the exchange of ideas, for improvement in the conditions in quarries and mills, and for development of the transportation, distribution, and sale of finished products.

Quarried from Life

By Liman Sandrock

Two Gentlemen from Gypsuma

GENTLE reader, fix your gaze upon the two giant intellectuals pictured below. Can you well believe that they are as the shrinking violet—hiding from the glare of publicity; fleeing from the spotlight of the printed word? It's true, though.

Macchiavelli himself, no mean historian,

George A. Olson, M. Sc.

would be forced to exercise his subtlest wiles to induce these modest gentlemen to loosen up on their past achievements. We couldn't, so we persuaded their gypsumian comrade in arms, Secretary H. H. MacDonald, to tell us all he knew of their past —that was to their credit.

Mr. Reader, meet Prof. George A. Olson, M. Sc., agricultural director, and Virgil G. Marani, chief engineer, of the Gypsum Industries Association.

Professor Olson was born in Chicago in 1874. He acquired the customary schooling —and a highly trained physique. So skilled was he that his youthful chest fairly bulged with deserved medals gained through his prowess. In due time he was graduated from Wisconsin University; had been an assistant chemist in the experiment station, and gathered a thorough knowledge of agricultural chemistry. His later work at the State College at Washington attests this statement. In the meantime he gained his degree of M. Sc.

In May, 1921, Professor Olson was appointed agricultural director of the G. I. A. He has made a lasting name for himself among agriculturalists and scientific journals throughout the country. We have done him but scant justice in this little sketch, but—

We must now introduce Professor Olson's fellow worker in the gypsum vineyard, yclept Virgil G. Marani, the G. I. A.'s chief engineer.

Just at the time Virgil saw fit to enter upon this vale of tears the American people were celebrating their independence, and incidentally expressing their gratitude to

Virgil G. Marani, C. E.

one Cristoforo Colombo and his fellow countryman, Americus Vespucius. For, be it known, Virgil was born on the Fourth of July, 18—(well, in these hectic days no one ever gets to be over forty)—in Reggio, Italy, of Italian-Scottish parents.

Shortly after his father's death the family went to Edinborough, Scotland, where with his two brothers Virgil received a common school education. He evidently imbibed too literally of the spirit of our Yankee independence, for he soon overstepped the rigid discipline of the Scottish school, and at 11 years of age ran away. For this he was placed on a naval schoolship, serving two years, with an honorable discharge because at that time his physique was unequal to completing the course.

At 13 he emulated a Stevenson hero and enlisted on a full-rigged ship and stuck to the sea until he was 21 years old. In that time he had twice circumnavigated the well-known globe.

Inheriting his share of his mother's estate, he came to Canada and paid his way through high school and university. Within four years Virgil was graduated from Toronto University; this was in 1895.

The next year he was employed in the Cleveland city engineer's office, working his way up from draftsman to sanitary engineer. For the next 10 years Mr. Marani was engineer of construction for the Cleveland Gas Light and Coke Co.; a private consultant and also doing engineering work as Marani & Moore; engineering superintendent of Cuyahoga's $5,000,000 county court house; later, with the National Fireproofing Co., of Pittsburgh. Then he was consulting engineer for the U. S. Gypsum Co., leaving them to serve the War Service Committee on Gypsum during the World War. Since 1918 he has been with the G. I. A.

Again, more honors, for Mr. Marani is a member of the American Society of Civil Engineers, the American Society for Testing Materials, the American Association of Engineers, the Cleveland Engineering Society, and the National Fire Protection Association. He never lost his love for ships, and today can gyp the jibboom, splice the main brace, douse the anchor or "kiss the gunner's daughter," without a faltering step.

Not long ago we foregathered with Virgil, the Prof., Mac, and a few chummy chaps from this office, and we got so interested in our feast of unreason and flow of fried sole that we forgot to tip the waitress and narrowly missed paying the checks. Come up some near day and we'll take you over.

They Said It

THE *Cleveland Commercial* gave ROCK PRODUCTS high praise for its really fine exhibit at the Mining Congress last week. Therefore we are forgiving it for spelling gypsum "jipson" and giving our Mr. Breskin a knock on the shin by calling him "Breshin."

"ROTUNDITY has a charm for humanity," says the Chicago *Journal of Commerce*—the child's soap bubbles, his marbles; the young man's base ball and tennis; old age, with golf balls; billiards with all ages. This journal cites many other round things, but wisely omits the rotund stomach! Personally, we have no guts for it.

Editorial Comment

Transportation Outlook

The crying injustice to the building-material producing industries, and more particularly the mineral aggregate industry, because of the transportation shortage, is brought out vividly in the article elsewhere on "The Transportation Breakdown." It is not to be wondered at that producers in the central west, where the pinch is greatest, are seriously considering an appeal to the courts for a definition of their fundamental rights as American citizens under the constitution of the United States. Certainly the future production of very important basic materials will have little appeal to men of means and brains if it lies within the power of the United States Government to continually interfere with the industry's only means of existence.

One obvious cause of the transportation shortage was the coal miners' strike. This created conditions almost identical with conditions in 1920; and there is every present prospect, with conditions to be in 1923. Without discussing the merits of the case, we all know that these strikes regularly prevent a big overproduction of coal, keep coal prices up, keep wages up, and allow both miners and operators to enjoy long summer vacations.

In the meantime all other industry suffers and pays the price. There is no right or justice in it, and it can't go on forever. But it will happen again next year if other users of transportation do not emphatically assert their rights. The present agreement between coal operators and miners ends April 1, 1923. The miners are already reported to have drafted demands for a 6-hour day, 5-day week, with double pay for overtime. Doubtless they should not have such terms and doubtless they don't expect them. They would rather have another long summer vacation and do nothing. With the operators it probably doesn't make much real difference. Either way would effectively limit the amount of coal produced and prevent destructive price cutting.

Somewhere, some way, sometime the amount of coal mined must be limited to the needs of the country and the operators protected from price-cutting by *legitimate* methods. And what applies to coal applies to every other basic commodity including crushed stone and gravel. It's a cinch lawyers and politicians are not going to find a way to do it, so producers must.

Crushed-Stone Convention

The 1923 convention of the National Crushed Stone Association at Chicago, January 15, 16 and 17, will be the biggest opportunity in the history of the quarry industry for quarry men to exchange ideas and experience and increase their practical knowledge of quarry operation. It is high time; for no other modern American industry exists with so little opportunity for conference between those responsible for operating methods and costs. The other mining industries, of which quarrying is at last being recognized as a branch, long ago established associations along the lines of engineering societies. Meetings of such associations are *schools or institutes* of mining practice and are an essential part of the life and education of mining men.

The fact that crushed stone is a cheap, low grade commodity does not remove the need for investigation, study and refinements in producing it. But for this very reason all the more attention must be paid to cost-saving ideas, experience, methods and equipment. In the case of gold ore worth $200 per ton, a saving of 5c. per ton in the cost of quarrying and crushing the rock is negligible; but in the case of a crushed-stone product selling for $1 per ton, a 5c. saving in quarrying costs may be the difference between bankruptcy and success. Therefore, to save five cents a ton in your costs is worth a trip to Chicago several times over. And if this convention is what quarry operators can and should make it, there is no reason why every operator who does attend should not profit by it to the extent of at least 5c. per ton.

Every saving in the cost of production of crushed-stone widens its market possibilities. The time will come when probably every mile of railway track in the United States and Canada will be rock ballasted. Then we will begin putting ballast under road pavements, as should be done today. The concrete era is in its infancy, and the production of crushed-stone products for special purposes has hardly been touched.

The future of the crushed stone industry lies in a thorough understanding of all the phases of the industry by quarry men and a thorough appreciation of the qualities and uses of crushed stone by engineers and architects. The 1923 convention of the crushed-stone industry at Chicago will offer an opportunity for a beginning on each of these aims. The presence of the American Road Congress in Chicago the same week will bring to Chicago engineers and machinery, material and equipment manufacturers to the number of thousands. The opportunity will be there not only of meeting and exchanging ideas and experience with other quarry men, but of meeting and getting the viewpoint of the men who *use* crushed stone, and of the men who make the machinery and equipment for producing and handling crushed stone.

Out of the proceedings of this convention it is hoped to begin building the first real permanent technical literature of quarry operation by quarry operators themselves. Therefore, every quarry operator in the United States and Canada owes it to himself and to his industry to be there—to contribute and learn and grow.

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Blakeslee, N. Y.	1.00	1.25	1.10	1.10	1.10	
Buffalo, N. Y.	1.30 per net ton all sizes					
Chaumont, N. Y.	1.00		1.50	1.25	1.25	1.25
Cobleskill, N. Y.	1.25	1.25	1.25	1.25	1.25	
Coldwater, N. Y.	1.50 per net ton all sizes					
Eastern Penna.	1.35	1.35	1.35	1.35	1.35	1.35
Munns, N. Y.	.75	1.15	1.15	1.15	1.15	1.15
Prospect, N. Y.	.75	1.25	1.25	1.25	1.25	
Walford, Pa.		1.30	1.30	1.30	1.30	1.30
Western New York	.75	1.20	1.20	1.20	1.20	1.20
CENTRAL						
Alton, Ill.	1.50		1.50	1.35	1.35	
Buffalo, Iowa	.90		1.20	1.00	1.05	1.10
Chasco, Ill.	1.30	1.25	1.25	1.25	1.20	
Chicago, Ill.	1.30	1.70	1.30	1.30	1.30	1.30
Dundas, Ont.	1.00	1.35	1.35	1.25	1.10	1.10
Faribault, Minn.					1.75	
Greencastle, Ind.	1.25	1.00	.90	.90	.90	.90
Kansas City, Mo.	1.00	1.50	1.50	1.50	1.50	1.50
Krause, Columbia and Valmeyer, Ill.	1.40	1.35	1.35	1.35	1.20	1.20
Lannon, Wis.	.80		.95	.85	.85	.85
Mitchell, Ind.	.80	.80	.80	.80	.80	.80
Montreal, Canada	.80	1.35	1.05	.95	.90	
Montrose, Ia.		1.50	1.60	1.55	1.45	1.40
River Rouge, Mich.	1.00	1.10	1.10	1.10	1.10	1.00
Sheboygan, Wis.	1.10	1.10	1.10	1.10	1.10	
Southern Illinois	1.35	1.25	1.25	1.25	1.10	
Stolle, Ill. (I. C. R. R.)	1.30		1.35	1.35	1.35	1.35
Stone City, Iowa	.75		1.40	1.30	1.25	
Toledo, Ohio	1.60	1.70	1.70	1.70	1.60	1.60
Toronto, Canada	1.90	2.25	2.25	2.25	2.00	2.00
Waukesha, Wis.	Prices include 90c freight all sizes .80 per ton					
SOUTHERN:						
Alderson, W. Va.	.75	1.25	1.40	1.25	1.15	
Bromide, Okla.	.75			1.50	1.50	
Cartersville, Ga.		2.00	2.00	1.40	1.40	1.40
Chickamauga, Tenn.	.75@1.00	.75@1.25		.75@1.00	.75@1.00	
Dallas, Texas	1.00	1.00	1.00	1.00	1.00	1.00
El Paso, Tex.	1.00	1.00	1.00	1.00	1.00	
Ft. Springs, W. Va.	.60	1.25	1.40	1.35	1.20	
Garnet and Tulsa, Okla.	.50	1.60	1.60	1.45	1.45	
Ladds, Ga.			1.40	1.40	1.40	
Morris Spur (near Dallas) Tex.	1.00	1.40	1.35	1.30	1.25	1.20
WESTERN:						
Atchison, Kans.	.50	1.80	1.80	1.80	1.80	1.80
Blue Springs and Wymore, Neb.	.20	1.65	1.65	1.55	1.45	1.40
Cape Girardeau, Mo.	1.50		1.50	1.50	1.25	
Kansas City, Mo.	1.00	1.50	1.50	1.50	1.50	1.40

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Bernardsville, N. J.	2.00	2.20	2.00	1.80	1.50	
Branford, Conn.	.60	1.50	1.25	1.05	.95	
Bound Brook, N. J.	1.80	2.30	1.90	1.50	1.40	
Dresser Jct., Wis.	1.00	2.25		1.75	2.00	
Duluth, Minn.	.90@1.00	2.00@2.25	1.75@2.00	1.40@1.50	1.30@1.40	1.50
E. Summit, N. J.	2.10	2.30	2.00	1.70	1.40	
Eastern Massachusetts	.60	1.85	1.40	1.40	1.40	1.40
Eastern New York	.75	1.50	1.30	1.30	1.40	1.40
Eastern Pennsylvania	1.15	1.50	1.45	1.35	1.30	1.30
New Britain, Middlefield, Rocky Hill, Meriden, Conn.	.60	1.35@1.45	1.15@1.25	1.05	.95@1.00	
Oakland, Calif.	1.75	1.75	1.75	1.75	1.75	1.75
Richmond, Calif.	.50*		1.50*	1.50*	1.50*	
Spring Valley, Calif.	.70	1.55	1.50	1.40	1.35	1.35
Springfield, N. J.	2.00	2.10	2.00	1.75	1.60	1.60
Westfield, Mass.	.60	1.35	1.25	1.10	1.00	

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Buffalo, N. Y.—Granite	.90		1.20	1.00	1.05	1.10
Berlin, Utley and Red Granite, Wis.	1.50	1.60	1.40	1.30	1.30	
Columbia, S. C.—Granite			1.75@2.00	1.75	1.60@1.75	
Dundas, Ont.—Limestone	1.00	1.35	1.35	1.25	1.10	1.10
Eastern Penna.—Sandstone	.85	1.55	1.55	1.40	1.35	1.30
Eastern Penna.—Quartzite	1.20	1.30	1.20	1.20	1.20	1.20
Lithonia, Ga.—Granite	1.00	2.00	2.00	1.35	1.35	
Lohrville, Wis.—Cr. Granite	1.35	1.40	1.30		1.20	
Middlebrook, Mo.—Granite	2.50@3.50		2.00@2.25	2.00@2.50		1.50
San Diego, Calif.	.50@ .70	1.45@1.75	1.40@1.70	1.30@1.60	1.25@1.55	1.25@1.55
Sioux Falls, S. D.—Granite	1.00	1.60	1.55		1.50	

*Cubic yard. †Agrl. lime. ||R. R. ballast. ‡Flux. ‡Rip-rap, a 3-inch and less.

Agricultural Limestone

EASTERN:

Chaumont, N. Y. — Analysis, 95% $CaCO_3$, 1.14% $MgCO_3$ — Thru 100 mesh; sacks, 4.00; bulk 2.50

Grove City, Pa.—Analysis, 97% $CaCO_3$ —100% thru 20 mesh, 60% thru 100 mesh, 40% thru 200 mesh; in 80 lb. paper sacks, 4.50; bulk 3.00

Hillsville, Pa. — Analysis, 96.25% $CaCO_3$; 75% thru 100 mesh; bulk.... 4.50

Jamesville, N. Y. — Analysis, 89.25% $CaCO_3$, 5.25% $MgCO_3$; pulverized limestone; sacks, 4.00; bulk..... 2.50

New Castle, Pa.—89% $CaCO_3$, 1.4% $MgCO_3$—75% thru 100 mesh, 84% thru 50 mesh, 100% thru 10 mesh; sacks, 4.75; bulk 3.06

Walford, Pa.—Analysis, 50% thru 100 mesh; 4.50 in paper; bulk..... 3.00

West Stockbridge, Mass., Danbury, Conn., North Pownal, Vt.—Analysis, 90% $CaCO_3$—50% thru 100 mesh; paper bags, 4.25—cloth, 4.75; bulk.... 3.00

CENTRAL:

Alton, Ill.—Analysis, 97% $CaCO_3$, 0.1% $MgCO_3$—90% thru 100 mesh..... 6.00
50% thru 50 mesh..... 4.00

Bedford, Ind. — Analysis, 98.5% $CaCO_3$, .5% $MgCO_3$—90% thru 10 mesh 1.50

Belleville, Ont. — Analysis, 90.9% $CaCO_3$, 1.15% $MgCO_3$—45% to 50% thru 100 mesh, 61% to 70% thru 50 mesh; bulk 2.50

Bellevue, Ohio — Analysis, 61.56% $CaCO_3$, 36.24% $MgCO_3$; ¼ in. to dust, about 20% thru 100 mesh..... 1.2

Bettendorf, Ia., and Moline, Ill.—97% $CaCO_3$, 2% $MgCO_3$—50% thru 100 mesh; 50% thru 4 mesh..... 1.25

Buffalo, Ia.—90% thru 4 mesh..... 1.00

Cape Girardeau, Mo. — Analysis, 93% $CaCO_3$, 3.3% $MgCO_3$—50% thru 100 mesh 1.50
90% thru 4 mesh, cu. yd..... 1.35

Chicago, Ill.—Analysis, 53.63% $CaCO_3$, 37.51% $MgCO_3$—90% thru 4 mesh.... 1.00

Columbia, Ill., near East St. Louis—½-in. down ..... 1.25@1.80

Detroit, Mich.—Analysis, 88% $CaCO_3$, 7% $MgCO_3$—75% thru 200 mesh, 2.50@4.75—60% thru 100 mesh..... 1.80@3.80

Elmhurst, Ill. — Analysis, 35.73% $CaCO_3$, 20.69% $MgCO_3$—50% thru 50 mesh 1.25

Greencastle, Ind. — Analysis, 98% $CaCO_3$—50% thru 50 mesh..... 2.00

Kansas City, Mo.—50% thru 100 mesh 1.50

Krause and Columbia, Ill.—Analysis, 90% $CaCO_3$, 90% thru 4 mesh..... 1.40

Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$—90% thru 50 mesh..... 2.00

Marblehead, Ohio — Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; pulv. limestone; 60% thru 100 mesh; sacks..... 4.50
Bulk 3.00

Milltown, Ind. — Analysis, 94.41% $CaCO_3$, 2.95% $MgCO_3$—33.6% thru 100 mesh, 40% thru 50 mesh..... 1.25@1.65

Mitchell, Ind. — Analysis, 97.65% $CaCO_3$, 1.76% $MgCO_3$, pulverized limestone 1.50

Montrose, Ia.—90% thru 100 mesh..... 1.25

Narlo, Ohio—Analysis 56% $CaCO_3$, 43% $MgCO_3$, limestone screenings, 37% thru 100 mesh; 55% thru 50 mesh; 100% thru 4 mesh..... 1.50@2.00

Ohio (different points), 20% thru 100 mesh; bulk ..... 1.25@1.50

Piqua, O.—90% thru 100..... 3.25@5.00
40% thru 100..... 1.75@2.00
100% thru 4..... 1.25

River Rouge, Mich. — Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk..... .80@1.40

Stolle, Ill., near East St. Louis on I. C. R. R.—Thru ½-in. mesh..... 1.30

Stone City, Ia.—Analysis, 98% $CaCO_3$ 50% thru 100 mesh..... .75

(Continued on next page)

Agricultural Limestone

(Continued from preceding page.)

Toledo, Ohio—¼-in. to dust, 20% thru 100 mesh 1.00
Waukesha, Wis.—No. 1 kiln dried..... 2.00
No. 2 Natural..... 1.75
Chasco, Ill.—Analysis, 96.12% $CaCO_3$, 2.5% $MgCO_3$—90% thru 100 mesh.... 5.00
90% thru 50 mesh..... 1.35
Yellow Springs, Ohio—Aanlysis 96.08% $CaCO_3$, 63% $MgCO_3$, 32% thru 100 mesh; 95.57%, sacked, 6.00; bulk.... 4.25

SOUTHERN:

Alderson, W. Virginia—Analysis 90% $CaCO_3$; 90% thru 50 mesh..... 1.75
Cape Girardeau, Mo. — Analysis, 93% $CaCO_3$, 3.5% $MgCO_3$ — 50% thru 100 mesh 2.00
90% thru 4 mesh..... 1.50
Cartersville, Ga.—Analysis, 54% $CaCO_3$, 41% $MgCO_3$—all passing 10 mesh..... 2.00
Claremont, Va.—Analysis, 92% $CaCO_3$, 2% $MgCO_3$—90% thru 100 mesh, 4.00; 50% thru 100 mesh, 3.00; 90% thru 50 mesh, 3.00; 50% thru 50 mesh, 2.75; 90% thru 4 mesh, 2.75; 50% thru 4 mesh..... 2.75
Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$—90% thru 50 mesh..... 1.75
Hot Springs, N. C.—50% thru 100 mesh, sacks, 4.25; bulk..... 3.00
Knoxville, Tenn.—80% thru 100 mesh; bulk, 2.70; 100% thru 10 mesh..... 2.30
Ladds, Ga.—50% thru 50 mesh..... 2.00
Linnville Falls, N. C.—Analysis, 53% $CaCO_3$; 42% $MgCO_3$—50% thru 100 mesh; 2.50 per ton bulk, 3.50 per ton mesh 200-lb. burlap; crushed limestone, ¾ down, including dust, 1.00; 1 to ¾, 1.60; 2-in. and less..... 1.40
Mountville, Va. — Analysis. 76.60% $CaCO_3$, 22.83% $MgCO_3$—50% thru 100 mesh; 50% thru 20 mesh; sacks.. 5.00

WESTERN:

Colton, Calif.—Analysis, 95% $CaCO_3$, 2-4% $MgCO_3$—all thru 14 mesh—bulk 4.00
Garnett, Okla.—Analysis, 80% $CaCO_3$, 3% $MgCo_3$; 50% thru 50 mesh ..... .50
Kansas City, Mo., Corrigan Sid'g—50% thru 100 mesh; bulk..... 1.80
Tulsa, Okla.—90% thru 4 mesh..... .50

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated.

GLASS SAND:

Baltimore, Md. 2.25
Berkley Springs, W. Va.....2.00@ 2.25
Cedarville and South Vineland, N. J.—Damp, 1.75; dry..... 2.25
Cheshire, Mass. .....5.00@10.00
Columbus, Ohio—Glass sand.....1.50@ 2.50
Dunbar, Pa. 2.25
Falls Creek, Pa. 2.50
Hancock, Md.—Damp.....1.25@ 1.75
Klondike and Pacific, Mo.....2.00@ 2.50
Mapleton, Pa. .....2.00@ 2.25
Massillon, Ohio 3.00
Michigan City, Ind.—Glass sand..... .50@ .55
Mineral Ridge, Ohio.....2.50@ 2.75
Green 2.00
Montoursville, Pa. 1.75
Oregon, Ill.—Glass sand.....1.25@ 1.75
Ottawa, Ill. 2.50
Pittsburgh, Pa.—Dry, 4.00; damp..... 3.00
Rockwood, Mich. 2.50
Round Top, Md.—Dry..... 1.25
San Francisco, Cal.....3.00@ 3.50
St. Mary's, Pa. 2.25
Thayers, Pa. 2.00
Utica, Ill. .....1.25@ 1.50
Zanesville, Ohio .....2.00@ 2.50

FOUNDRY SAND:

Albany, N. Y.—Sand blast..... 3.75
Molding fine and brass molding..... 2.00
Molding coarse 1.75
Allentown, Pa.—Core and molding fine 1.50@1.75
Arenzville, Ill.—Molding fine..... 1.40@1.60
Beach City, O. — Core, washed and screened ..... 2.00@2.50
Furnace lining ..... 2.50@3.00
Molding fine and coarse..... 2.25@2.50
Cheshire, Mass.—Furnace lining, molding, fine and coarse..... 5.00
Sand blast ..... 5.00@8.00
Stone sawing 6.00
Cleveland, O.—Molding coarse..... 1.50@2.00
Brass molding ..... 1.50@2.00
Molding fine ..... 1.50@2.25
Core ..... 1.25@1.50
Columbus, Ohio—Core ..... .30@2.00
Sand blast ..... 3.50@5.00
Furnace Lining 1.75
Molding fine 2.00
Molding coarse ..... 1.50@2.00
Stone sawing ..... 1.50@2.00
Traction ..... .90
Brass molding ..... 2.00@2.50

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, ¼ inch and less	Gravel, ½ inch and less	Gravel, 1 inch and less	Gravel, 1½ inch and less	Gravel, 2 inch and less
EASTERN:						
Attica, N. Y.	.75	.75	.75	.60	.60	.60
Ambridge and So. Heights, Pa.	1.15	1.15	1.15	1.15	.70	.70
Buffalo, N. Y.	1.10	.95			.85	
Erie, Pa.		.65	.90		1.00	
Farmingdale, N. J.	.48	.48	1.00	1.20	1.20	
Hartford, Conn.	.90		1.25	1.15	1.15	1.15
Leeds Junction, Me.		.50	1.75	1.35		1.25
Machias, N. Y.	.95	.95	1.25	.85	.85	.85
Pittsburgh, Pa.	1.15	1.15	1.15	.70	.70	.70
Portland, Maine		.50	1.75		1.35	1.35
Washington, D. C. (rewashed, river)	.75	.75	1.60	1.40	1.20	1.20
CENTRAL:						
Alton, Ill.		.85				
Anson, Wis.	.40	.40				.90
Barton, Wis.		.60		.70	.70	
Beloit, Wis.		.50			.50	
Chicago, Ill.		1.75@2.23	1.75@2.43			
Cincinnati, Ohio	.70	.65	.90	.90	.90	.90
Columbus, Ohio	.75	.75@1.00	.65@1.00	.75@1.00	.75@1.00	.75
Des Moines, Iowa	.60	.60	1.70	1.70	1.70	1.70
Detroit, Mich.	.65	.65	.95	.95	.95	.95
Farlestead (Flint), Mich.	.70		60-40 sieves, .85; Pebbles, .95			
Eau Claire, Wis.	.45	.45	1.25	1.00		.90
Elkhart Lake, Wis.	.50	.40	.60	.50	.50	.50
Ft. Dodge, Ia.		1.22		2.17		
Grand Rapids, Mich.		.50		.80		.70
Greenville, Mechanicsburg, O.	.65	.65	.65	.65	.65	.65
Hamilton, Ohio		.90			.90	
Hawarden, Ia.		.50			1.60	
Hersey, Mich.		.40		.60	.60	
Indianapolis, Ind.	.60	.60		1.50	.75@1.00	.75@1.00
Janesville, Wis.		.65@ .75			.65@ .75	
Libertyville, Ill.		.50		.70		
Mankato, Minn.—Pit run	.50	.40	.40		1.25	
Mason City, Ia.	.75	.65	1.80	1.80	1.70	1.65
Mendota, Ill.	.60@1.05	.60@1.05	.60@1.05	.60@1.05	.60@1.05	.60@1.05
Milwaukee, Wis.	1.06	1.06	1.26	1.26	1.26	
Minneapolis, Minn.	.35	.35	1.25@1.35	1.25@1.35	1.25	1.25
Moline, Ill.	.60@ .90	.60@ .90	1.20@1.50	1.20@1.50	1.20@1.50	1.20@1.50
Riton, Wis.		.60			.80	
St. Louis, Mo., f.o.b. cars	1.20	1.45	1.65	1.45		1.40
St. Louis, Mo., delivered on job	2.05	2.20	2.35	2.15		2.10
Summit Grove, Clinton, Ind.	.65@ .75	.60@ .75	.60@ .75	.60@ .75	.60@ .75	.60@ .75
Terre Haute, Ind.	1.00	1.00	1.00	1.25	1.00	1.00
Waukesha, Wis.	.50		All other sizes, .70 per ton			
Winona, Minn.	.40	.40	1.25	1.00	1.00	1.00
Yorkville, Sheridan, Moronts, Oregon, Ill.	.60	.50@ .70		.60@ .80	.50@ .70	.60
SOUTHERN:						
Alexandria, La.		.70			1.20@1.35	
Birmingham, Ala.	1.48		all gravel—1.88			
Charleston, W. Va.		1.40	1.50			
Estill Springs, Tenn.	1.35	1.15		1.00	.85	.65
Ft. Worth, Tex.	2.00@2.25	2.00@2.25	2.00	2.00	2.00	2.00
Jackson's Lake, Ala.	.50@ .60	.50@ .60	.40@1.00	1.00	.50@1.00	.50@1.00
Knoxville, Tenn.	.75	.75	1.25	1.25	1.25	1.00
Lake Weir, Fla.		.60				
Macon, Ga.		.50@ .75				
Memphis, Tenn.	1.12	1.12				1.95
N. Martinsville, W. Va.	1.00	1.00	1.20			.80
New Orleans, La.		.50			1.00	
Pine Bluff, Ark.	1.20	.90	Washed gravel, all sizes, 2.25			
Roseland, La.	.50			1.00		
WESTERN:						
Grand Rapids, Wyo.	.50	.50	.85	.85	.80	.80
Kansas City, Mo.	(Kaw River sand, car lots, .75 per ton. Missouri River, .85)					
Los Angeles, Calif.		1.00		1.50	1.50	
Pueblo, Colo.	1.10*	.90*			1.50	
San Diego, Calif.	.80@1.00	.80@1.00	1.30@1.60	1.25@1.55	1.15@1.45	1.15@1.45
San Francisco, Calif.		1.00	1.00@1.20	.85@1.00	.85@1.00	.85@1.00
Seattle, Wash.	1.00*	1.00*	1.00*	.85*	.85*	1.00*
Spring Valley, Calif.	.70	.80	1.40	1.35	1.25	1.25

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch	Sand, ¼ inch	Gravel, ½ inch	Gravel, 1 inch	Gravel, 1½ inch	Gravel, 2 inch
Boonville, N. Y.	.60@ .80		.55@ .75			1.00
Cape Girardeau, Mo.			River sand, 1.00 per yd.			
Cherokee, Iowa			.80 per ton—1.20 washed			
Dudley, Ky. (Crushed Sand)	1.00	1.00		.90		
East Hartford, Conn.			.65 per cu. yd.			
Estill Springs, Tenn.						.85
Fishers, N. Y.		.50@ .65		.50@ .65		
Grand Rapids, Mich.						.50
Hamilton, Ohio			.45 per cu. yd. in pit			
Hartford, Conn.		1.00*				
Hersey, Mich.				.50		
Indianapolis, Ind.			Mixed gravel for concrete work, .65			
Lindsay, Tex.						.55
Janesville, Wis.		.65			.65@ .75	
Pine Bluff, Ark.			Road gravel .50			
Rochester, N. Y.	.60@ .75	.60@ .75		.50@ .65	.50@ .65	
Roseland, La.		.75				
Saginaw, Mich., f.o.b. cars		.75	1.30	1.30	1.30	1.30
St. Louis, Mo.			60% gravel, 40% sand, 1.55			
Summit Grove, Ind.	.50	.50	.50	.50	.50	.50
Waco, Tex.		.80		1.50		1.30
Winona, Minn.			Clean pit run .60			
York, Pa.		.95@1.10		(crushed rock sand)		

*Cubic yard. B Bank. L Lake. || Ballast.

Crushed Slag

City or shipping point	Roofing	¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:							
Buffalo, N. Y.	2.35	1.35	1.35	1.35	1.35	1.35	1.35
E. Canaan, Conn.	4.00	1.00	2.50	1.35	1.25	1.15	1.15
Eastern Pennsylvania and Northern New Jersey	2.00	1.20	1.50	1.20	1.20	1.20	1.20
Easton, Pa.	2.00	.80	1.25	.90	.85	.80	.80
Erie, Pa.	2.35	1.35	1.35	1.35	1.35	1.35	1.35
Emporium, Pa.			1.35	1.35		1.35	1.35
Sharpsville and West Middlesex, Pa.	2.00	1.30	1.70	1.30	1.30	1.30	1.30
Western Pennsylvania	2.00	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Chicago, Ill.	All sizes, 1.50, F. O. B. Chicago						
Detroit, Mich.	All sizes, 1.65, F. O. B. Detroit						
Ironton, O.	2.05	1.45	1.75	1.45	1.45	1.45	1.45
Steubenville, O.	2.00	1.40	1.70	1.40	1.40	1.40	1.40
Toledo, O.	1.92	1.67	1.77	1.77	1.77	1.67	1.67
	(Any delivery in city except team track deliveries)						
Youngstown, Dover, Hubbard, Leetonia, Struthers, O.	2.00	1.25	1.50	1.25	1.25	1.25	1.25
Steubenville, Lowellville and Canton, O.	2.00	1.35	1.60	1.35	1.35	1.35	1.35
SOUTHERN:							
Ashland, Ky.		1.55		1.55	1.55	1.55	1.55
Birmingham, Ala.	2.05	.80	1.25	1.15	1.10	.95	.85
Ensley, Ala.	2.05	.80	1.25	1.15	1.10	.95	.85
Longdale, Goshen, Glen Wilton & Low Moor, Roanoke, Va.	2.50	1.00	1.00	1.25	1.25	1.15	1.05

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing Hydrate	Masons' Hydrate	Agricultural Hydrate	Chemical Hydrate	Ground Burnt Lime Blk.	Ground Burnt Lime Bags	Lump Lime Blk.	Lump Lime Bbl.
EASTERN								
Adams, Mass.			7.00				2.80	
Bellefontaine, Pa.			8.00	9.00	8.00		8.50	
Berkley, R. I.			**12.00**					**2.30**
Buffalo, N. Y.	10.50	9.00	8.50@11.00	12.00	8.00	10.00	8.00	1.50
Chaumont, N. Y.					**2.50**	**4.00**		
Lime Ridge, Pa.							5.00	
West Rutland, Vt.	13.50	12.00	7.50	13.50			10.00	
West Stockbridge, Mass.								2.25
Williamsport, Pa.			10.00			10.00	6.00	
York, Pa. (dealers' prices)		10.50	10.50	11.50			8.50	1.65*
Zylonite, Mass.	3.20d	2.90d	7.00					
CENTRAL:								
Cold Springs, Ohio	10.50	9.00	8.50		7.25	9.25	8.00	
Delaware, Ohio	10.50	9.50	8.50	10.00			8.50	1.60
Gibsonburg, Ohio	11.50	10.00	10.00		8.00	10.00	9.00	
Huntington, Ind.	11.50	9.00	8.50				8.00	1.70*
Luckey, Ohio	10.00	9.00	8.00					
Marblehead, Ohio	10.50	10.00	10.00				9.00	1.60
Marion, Ohio		10.00	10.00					
Mitchell, Ind.		12.00	12.00	12.00	11.00		10.00	1.60
Sheboygan, Wis.								7.50d
White Rock, Ohio	11.50	9.00	8.50	11.00	7.25	9.25	8.00	1.50
Woodville. O. (dlrs.' price)	10.50a	10.50a	8.00a	10.50a	7.25		8.00	1.60
SOUTHERN:								
Erin, Tenn.							**6.00**	**1.00**
Karo, Va.							7.00	1.30
Knoxville, Tenn.	11.50@18.00	11.00	11.00	11.00	10.00	11.00	8.50	1.50
Ocala and Zuber, Fla.	12.00	11.50	11.50	14.00			12.00	1.60
Sherwood, Tenn.	12.00	11.00					8.50	1.50
Staunton, Va.					7.00	8.00	7.50b	1.40
WESTERN:								
Colton, Calif.			15.00				19.70	
Kirtland. N. Mex.							15.00	
San Francisco, Calif.	22.00	22.00	15.00	22.00			16.00	2.15*
Tehachapi, Calif.							13.00	2.00

‡100-lb. sacks; *180-lb. net, price per barrel; †180-lb. net, non-returnable metal barrel; §Paper sacks. (a) 50-lb. paper bags; terms, 30 days net; 25c per ton or 5c per bbl. discount for cash in 10 days from date of invoice. (b) Burlap bags. (c) 200-lb. bbl. (d) 280-lb. bbl. net.

Miscellaneous Sands

(Continued from preceding page)

Delaware, N. J.—Molding fine 2.00
Molding coarse 1.90
Brass molding 2.15

Dresden, O.—Core and traction 1.00
Molding, fine and coarse 1.25
Brass molding 1.50

Dunbar, Pa.—Traction, damp 2.25

Dundee, O.—Glass, core, sand blast, traction 2.50
Molding fine, brass molding (plus 75c for winter loading) 2.00
Molding coarse (plus 75c for winter loading) 1.75

Eau Claire, Wis.—Core 1.00@1.25
Sand blast 3.25@3.75

Falls Creek, Pa.—Molding, fine and coarse 1.75
Sand blast 2.00
Traction 1.75

Franklin, Pa.—Core 1.25@1.75
Furnace lining 2.50
Molding fine 2.00
Molding coarse 1.75
Brass molding 2.00

Greenville, Ill.—Molding coarse 1.30@1.50

Joliet, Ill.—Milled, dried and screened No. 2 coarse molding sand and open hearth loam and luting clay (for molding only) .60@ .80
.70

Kansas City, Mo.—Missouri River core .80

Kasota, Minn.—Stone sawing 1.30@1.50

Klondike, Pacific, Gray Summit, Mo.—Glass sand, furnace lining, molding coarse 2.00@2.50
Molding fine 2.00

Mapleton, Pa.—Glass, core, furnace lining, molding fine and coarse, roofing sand, sand blast, stone sawing, traction, brass molding; damp, 2.25; dry 2.75

Massillon, O. — Traction, molding fine and coarse, furnace lining, core 2.75

Michigan City, Ind.—Core, traction .40@ .45

Mineral Ridge, Ohio—(Green) core 2.00
Furnace lining, molding fine and coarse, roofing, sand blast, stone sawing and traction, brass molding 2.00

Montoursville, Pa.—Core 1.25
Traction 1.00
Molding fine 1.50
Molding coarse 1.50@2.00

New Lexington, O.—Molding fine 2.00
Molding coarse 1.50

Oregon, Ill.—Core, furnace lining 1.25@1.75
Sand blast 3.00@3.50
Stone sawing 3.00@3.50
Traction 1.25

Ottawa, Ill.—Core, furnace lining, molding fine and coarse, traction, brass molding 2.50
Roofing sand 2.50@3.00
Sand blast 3.50
Stone sawing 3.00

Ottawa, Minn.—All crude silica sand .75@1.00

Pelzer, S. C.—Glass sand (carload lots

Rockwood, Mich.—Core, damp 1.90
Roofing 2.75
Sand blast 3.75

Miscellaneous Sands

(Continued)

Round Top, Md.—Glass sand 1.75@2.00
Core, furnace lining 1.45
Traction 1.60

(All per 2000 lbs.)

San Francisco, Cal. (Washed and dried)—Core, molding fine, roofing sand and brass molding 3.00@3.50
Direct from pit.
Furnace lining, molding coarse, sand blast 3.60
Stone sawing, traction 2.30

Thayers, Pa.—Core 1.75@2.00
Furnace lining 1.25
Molding fine and coarse 1.25
Traction 2.00

Utica, Ill.—Core 1.00
Furnace lining 1.25@1.50
Molding fine .90
Molding coarse 1.00
Stone sawing 1.25

Utica, Pa.—Core 1.25@2.25
Molding fine and coarse, traction, brass molding 2.00

Warwick, O. — Core, furnace lining, molding fine and coarse (damp, 1.75) dry 2.00
Traction, brass molding (dry) 2.00

Zanesville, Ohio — Brass molding and molding fine 1.50@1.75
Molding coarse 1.25@1.50

Talc

Prices given are per ton f. o. b. (in carload lots only) producing plant, or nearest shipping point.

Asheville, N. C.—Crude talc 5.00
Ground talc (20-50) mesh), bag extra 7.00
Ground talc (150-200 mesh), bag extra 8.00
Pencils and steel workers' crayons, per gross 1.30@ 2.00

Baltimore, Md.—Ground talc (20-50 mesh), bags 10.00
Ground talc (150-200 mesh), bags 14.00
Cubes 50.00
Blanks (per lb.) .07

Chatsworth, Ga.—Crude talc 7.00
Ground talc (150-200 mesh); bags 15.00
Pencil and steel workers' crayons 1.50@ 2.50

Chester, Vt.—Crude talc 5.50
Ground talc (150-200 mesh) incl. bags 8.00@10.00

Emeryville, N. Y.—200-325 mesh; bags 14.00@16.00

Glendale, Calif.—Ground talc (150-200-mesh) 16.00@30.00
(Bags extra)
Ground talc (50-300 mesh) 13.50@15.50
200 mesh 13.50@14.50

Hailesboro, N. Y.—Ground talc (150-250 mesh), bags 18.00

Henry, Va.—Crude talc (lump mine run), per 2000-lb. ton 2.75@ 3.50
Ground talc (20-50 mesh) 6.50@ 7.75
(150-200 mesh) bags 8.75@13.50

Johnson, Vt. — Ground talc (20-50 mesh), bulk 7.50; (150-200 mesh) 8.00@15.00
(Bags extra)
Ground talc (150-200 mesh), bulk 10.00@15.00
(Bags extra)

Los Angeles, Calif.—Ground talc (200 mesh) (includ. bags) 16.00@20.00

Mertztown, Pa.—Ground talc (20-50 mesh); bulk 4.00; bags 5.00
(150-200 mesh); bulk 6.00; bags 7.00

Natural Bridge, N. Y.—Ground talc (150-200 mesh) bags 12.00@13.00

Rochester and East Granville, Vt.—Ground talc (20-50 mesh), bulk 8.50@10.00
(Bags extra)
Ground talc (150-200 mesh), bulk 10.00@22.00
(Bags extra)

Vermont—Ground talc (20-50 mesh); bags 7.50@10.00
Ground talc (150-200 mesh); bags 8.50@15.00

Waterbury, Vt. — Ground talc (20-50 mesh), bulk 7.50
(Bags 1.00 extra)
Ground talc (150-200 mesh), bulk 9.00@14.00
(Bags 1.00 extra)
Pencils and steel workers' crayons, per gross 1.20@ 2.00

Rock Phosphate

Raw Rock

Per 2240-lb. Ton

Centerville, Tenn—B.P.L. 72% to 75% 6.00@8.50
B.P.L. 65% 6.00

Gordonsburg, Tenn.—B.P.L. 65%-70% 4.00@5.50

Tennessee—F. o. b. mines, long tons, unground Tenn. brown rock, 72% B. P. L. 7.00

Mt. Pleasant, Tenn. — Analysis, .70 B.P.L. (2000 lbs.) 6.50

Montpelier, Idaho—70% B.P.L.—Crude 4.75
Crushed 2-in. ring and dried 5.00

Paris, Idaho.—2,000 lb. mine run, B.P.L. 70% 4.00

(Continued on next page)

Roofing Slate

The following prices are per square (100 sq. ft.) for Pennsylvania Blue-Gray Roofing Slate, f.o.b. cars quarries:

Sizes	Genuine Bangor, Washington Big Bed, Franklin Big Bed	Genuine Albion	Slatington Small Bed	Genuine Bangor Ribbon
24x12	$ 9.30	$8.40	$8.10	$7.80
24x14	9.30	8.40	8.10	7.80
22x12	10.80	8.70	8.40	9.10
22x11	10.80	8.70	8.40	9.10
20x12	10.80	8.70	8.40	9.10
20x10	11.70	9.00	8.70	8.40
18x10	11.70	9.00	8.70	8.40
18x 9	11.70	9.00	8.70	8.40
16x10	11.70	8.40	8.40	8.10
16x 9	11.70	8.40	8.40	8.10
16x 8	11.70	8.40	8.40	8.10
18x12	11.10	8.70	8.40	8.10
16x12	11.10	8.70	8.40	8.10
14x10	11.10	8.40	8.10	7.80
14x 8	11.10	8.40	8.10	7.80
14x 7 to 12x6	9.60	8.40	8.10	.....
	Mediums	Mediums	Mediums	Mediums
24x12	$ 8.10	$7.50	$7.20	$5.75
22x11	8.40	7.80	7.50	5.75
Other sizes	8.70	8.10	7.80	5.75

For less than carload lots of 20 squares or under, 10% additional charge will be made.
Granulated slate per net ton f. o. b. quarries, Vermont and New York, 7.50.

(Continued from preceding page)

Ground Rock

Wales, Tenn.—B.P.L. 70%	7.75
Per 2000-lb. Ton	
Barton, Fla. — Analysis, 50% to 65% B.P.L.	3.50@8.00
Centerville, Tenn.—B.P.L. 65%	6.00
B.P.L. 75% (brown rock)	12.00
Columbia, Tenn.—B.P.L. 68% to 72%	5.50
B.P.L. 65% (90% thru 200 mesh) bulk	5.50
Morriston, Fla.—Analysis, 35% B.P.L.	12.00
Mt. Pleasant, Tenn.—B.P.L. 70%	5.00@6.50

Florida Soft Phosphate

Raw Land Pebble

Per Ton	
Bartow and Norwills, Fla.—B.P.L. 50%, bulk	6.00@ 8.00
B.P.L. 78%, bulk	13.50
Florida—F. o. b. mines, long ton, 68/66% B.P.L.	3.00
68% (min.)	3.25
70% (min.)	3.50
Jacksonville (Fla.) District	10.00@12.00

Ground Land Pebble

Per Ton	
Jacksonville (Fla.) District	14.00
Add 2.50 for sacks.	
Lakeland, Fla.—B.P.L. 60%	6.00
Morristown, Fla.—26% phos. acid	16.00
Mt. Pleasant, Tenn.—65-70% B.P.L.	5.00@ 6.00

Special Aggregates

Prices are per ton f. o. b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco chips
Chicago, Ill.—Stucco chips, in sacks f.o.b quarries		17.50
Deerfield, Md. — Green; bulk	7.00	7.00
Easton, Pa.—Evergreen, creme green and royal green marble	8.00@10.00	12.00@14.00
Slate granules		7.00@8.00
Granville, N. Y. — Red slate granules		7.50
Ingomar, Ohio	6.00@14.00	10.00@25.00
Lincoln, Neb. — Red, white, gray, in bags		30.00
granite; sacks	28.50@30.00	20.00@22.50
Milwaukee, Wis.		20.00@30.00
New York, N. Y.—Red and yellow Verona		32.00
Middlebrook, Mo.—Red		25.00@30.00
Phillipsb'g, N. J.—Green stucco dash		12.00@14.00
Piqua, O.—Marble		7.00@ 9.00
Poultney, Vt. — Roofing granules		7.50
Red Granite, Wis.		7.50
Sioux Falls, S. D.	7.50	7.50
Tuckahoe, N. Y.	12.00	14.00
Whitestone, Ga.—White marble chips, net ton in bulk, f.o.b., bags		
10c extra	5.00	5.00

Concrete Brick

Prices given per 1,000 brick, f. o. b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	20.00	25.00@35.00
Bellows Falls, Vt.	18.00	25.00@35.00
Birmingham, Ala.	13.50	25.00@35.00
Carpenterville, N. J.	20.00	36.00
Easton, Pa.	16.00	40.00@60.00
Eugene, Ore.	25.00@26.00	50.00@75.00
Friesland, Wis.	20.00	33.00
Houston, Tex.		19.50
Lockport, N. Y.	16.00	
Omaha, Neb.	20.00	30.00
Piqua, O.	15.00	25.00
Portland, Ore. (Del'd)	21.00	30.00@60.00
Puyallup, Wash.	20.00	30.00@75.00
Rapid City, S. D.	18.00	25.00@40.00
Rochester, N. Y.	21.00	
St. Paul, Minn.	15.00	30.00@35.00
Salem, Ore.	25.00	35.00@50.00
Salt Lake City, Utah	17.00@18.00	35.00@40.00
Seattle, Wash.	22.00	35.00@80.00
Springfield, Ill.	18.00	20.00@25.00
Tampa, Fla.	15.00	25.00@65.00
Wauwatosa, Wis.	14.00@15.00	30.00@65.00

Sand-Lime Brick

Prices given per 1,000 brick f. o. b. plant or nearest shipping point, unless otherwise noted.

Albany, Ga.	7.00
Barton, Wis.	10.00
Boston, Mass.	14.00@15.00
Brighton, N. Y.	14.75
Buffalo, N. Y.	16.50
Dayton, Ohio	12.50@13.50
El Paso, Texas	13.00
Grand Rapids, Mich.	12.50
Lancaster, N. Y.	13.25
Michigan City, Ind.	11.00
Milwaukee, Wis.	14.00
Minneapolis, Minn.	13.00
Plant City, Fla.	10.00
Portage, Wis.	15.00
Redfield, Mass.	15.00
Rives Junction, Mich.	11.00
Saginaw, Mich.	11.00
San Antonio, Texas—Common	15.00
South Dayton, Ohio	12.50@13.50
Syracuse, N. Y. (delivered at job)	18.00
f.o.b. cars	14.00
Washington, D. C.	14.50
Winnipeg, Can.	17.00@25.00

Lime

Warehouse prices, carload lots at principal cities.

	Hydrate per Ton Finishing	Common
Atlanta, Ga.	19.00	16.00
Baltimore, Md.	15.00	13.00
Boston, Mass.	23.00	20.00
Cincinnati, Ohio	19.60	14.50
Chicago, Ill.	18.00	.....
Dallas, Tex.	25.00	.....
Denver, Colo.	30.00	.....
Detroit, Mich.	15.25	13.25
Fort Dodge, Ia.	19.70	17.00
Grand Rapids, Mich.	15.65	.....
Los Angeles, Calif.	30.00	30.00
Minneapolis, Minn.	29.00	22.00
Montreal, Que.	21.00	21.00
New Orleans, La.	.....	17.25
New York, N. Y.	16.99	.....
St. Louis, Mo.	23.20	20.00
San Francisco, Calif.	22.00	18.00
Seattle, Wash.	27.00	.....

	Lump per 180-lb. Barrel (net) Finishing	Common
Atlanta, Ga.	2.00	1.50
Baltimore, Md.	.....	12.00†
Boston, Mass.	3.35	3.10
Cincinnati, Ohio	.....	12.25
Chicago, Ill.	.....	1.40
Denver, Colo.	.....	2.95
Detroit, Mich.	11.50†	10.50†
Los Angeles, Calif.	3.00*	3.00*
Minneapolis, Minn.	1.70	1.40
New Orleans, La.	.....	1.75
New York, N. Y.	.....	3.69*
St. Louis, Mo.	.....	.70*
San Francisco, Calif.	.....	1.90
Seattle, Wash.	3.25	2.75
Sheboygan, Wis.	.....	10.00

*280-bbl. (net). †Per ton.

Portland Cement

Current prices per barrel in carload lots, f. o. b. cars, without bags.

Atlanta, Ga. (bags)	3.45
Boston, Mass.	2.61
Cedar Rapids, Iowa	2.45
Cincinnati, Ohio	2.51
Cleveland, Ohio	2.46
Chicago, Ill.	2.20
Dallas, Tex.	2.25
Davenport, Iowa	2.43
Denver, Colo.	2.65
Detroit, Mich.	2.48
Duluth, Minn.	2.14
Indianapolis, Ind.	2.41
Kansas City, Mo.	2.30
Los Angeles, Calif.	3.06
Milwaukee, Wis.	2.37
Minneapolis, Minn.	2.39
Montreal, Can. (sacks 20c extra)	2.40
New Orleans, La.	2.80
New York, N. Y. (includes bags)	2.40
(10c per bbl. discount in 10 days)	
Peoria, Ill.	2.41
Pittsburgh, Pa.	2.24
Portland, Ore.	3.00
St. Louis, Mo.	2.35
San Francisco, Calif.	2.63
St. Paul, Minn.	2.39
Toledo, Ohio	2.48
Seattle, Wash.	2.90

NOTE—Add 40c per bbl. for bags.

Gypsum Products— CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco* Calcined Gypsum	Cement‡ and Gauging Plaster	Wood Fiber	White§ Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	Plaster Board ¼x32x36" Weight 1500 lb. Per M Sq. Ft.	Plaster Board ⅜x32x36" Weight 1850 lb. Per M Sq. Ft.	Wallboard, ⅜x32 or 48" Lengths 6'-10', 1850 lb. Per M Sq. Ft.
Douglas, Ariz.	.....	.....	6.00	13.00	.....	12.00	.....	.....	.....	14.00	.....	.....	.....
Fort Dodge, Iowa	3.00	3.50	6.00	8.00	10.00	10.50	20.00	.....	21.30	20.00	20.00	.....	30.00
Garbutt, N. Y.	.....	.....	6.00	8.00	10.00	10.00	.....	7.00	.....	.....	.....	20.00	.....
Grand Rapids, Mich.	3.00	.....	6.00	8.00	10.00	10.00	.....	.....	31.25	21.00	19.38	20.00	30.00
Hanover, Mont.	4.50	.....	6.00	10.00	.....	10.50	.....	.....	.....	.....	.....	.....	.....
Mound House, Nev.	.....	8.50	6.50	10.50@11.50	.....	.....	.....	.....	.....	.....	.....	.....	.....
Oakfield, N. Y.	3.00	4.00	6.00	8.00	10.00	10.00	20.20	7.00+	30.75	21.00	19.375	20.00	30.00
Rapid City, S. D.	4.00	.....	.....	10.00	12.00	12.50	.....	.....	33.75	.....	.....	.....	.....
Winnipeg, Man.	5.50	5.50	7.00	13.50	15.00	15.00	.....	.....	.....	.....	28.50	.....	35.00

NOTE—Returnable Jute Bags, 15c each, $3.00 per ton; Paper Bags, $1.00 per ton extra.
*Shipment in bulk 25c per ton less; ‡Bond plaster $1.50 per ton additional; +Sanded Wood Fiber $2.50 per ton additional; §White Moulding 50c per ton additional; ||Bulk; (a) Includes sacks.

Bentonite and Its Purposes

WE are told by the Department of Agriculture that by the gathering of old newspapers about 2,500 tons can daily be turned back into news-print through the de-inking process.

This saving in turn will equal the yearly cut of spruce grown on about 275,000 acres. Thus, newspapers saved means forests saved. The Department of Agriculture, through its forest service, is greatly interested in this matter. The spruce forests must be saved. It is now estimated that the daily consumption of newsprint in the United States is 7,000 tons.

The present supply, coming largely from mills in the northeast and lake states is derived from forests in the United States now seriously depleted, or from less accessible forests in Canada. The latter now furnish 65 per cent of the raw pulp used by mills in this country.

Utilizing the Enormous Newspaper Waste

It is only in recent years, however, that it has been realized that it would not only be good business to utilize the enormous waste represented in printed paper, but was an absolute necessity if the consumption of newsprint continued to grow and the supply of spruce timber to diminish.

Early in 1921 the Department of Agriculture undertook a series of comparative tests to determine the efficiency of a process, using bentonite to accomplish the heretofore almost impossible task of washing all the carbon black out of the macerated pulp after it had been loosened by alkalies. S. D. Wells, the engineer in charge of the experiments, now reports that they were successful.

"In de-inking printed paper and especially newspaper," says Mr. Wells, "it is comparatively easy to loosen the carbon black by dissolving the varnish of the printing ink by use of alkalies. Such treatment will not injure ground wood pulp and if the carbon black could be completely washed out after liberation, a satisfactory material would be obtained.

"Unfortunately the fibers of the paper stock serve as a very effective filter in enmeshing the particles of carbon and there are no means of washing in common use that will permit their complete removal without excessive loss of pulp or expenditure of time, water and power that are prohibitive. In fact, a point seemed to be reached beyond which it is impossible to remove the remaining traces of ink. With bentonite, however, we have a substance that will pass through ordinary filters and with its enormous surface, on account of the extreme fineness of its particles, will carry all the carbon black along with it."

How the Geological Survey Defines Bentonite

Bentonite is defined by the Geological Survey as "a transported, stratified, volcanic ash that has been altered shortly after deposition." It is very fine grained and has the property of swelling in contact with water to several times its original volume. Like any natural product, different deposits vary considerably, and Mr. Wells says that the best supply that has come to his notice is found in Wyoming.

"When the price paid for old paper stimulated collection," says Mr. Wells, "it is reported that about 25,000 tons per month were collected in Chicago, of which 40 per cent was news. During the same period Cleveland is reported to have handled 350 tons per day of which 150 tons were news.

"In our large metropolitan centers probably 2,500 tons per day were collected, which would furnish a very considerable portion of our daily consumption of 7,000 tons of newsprint. The source of this raw material is furthermore at the place of consumption and the saving in freight is a very important item.

Overcoming the Color Requirements

"The color requirements of the publishers at the present time are very severe and any process that does not thoroughly remove ink cannot be successful. While considerable difficulty was encountered in meeting these requirements, in our trials the results obtained as the process has been finally worked out seem to justify our belief that they can be met."

The logical location for de-inking plants, according to the experts, will be in a number of the large urban centers where the supply of raw material—old newspapers—is great and most readily obtained with a minimum of handling and hauling charges, and where, in turn, the demand for newsprint is greatest.

The wide application of the de-inking of old newspapers has potentially a very important bearing on the forestry problem in America today.

Novel No-Accident Contest

A NOVEL contest was recently staged at the Glens Falls Portland Cement Co.'s plant, Glens Falls, N. Y., under the direction of Frank Sansouci, safety director, the object being to eliminate accidents. The contestants were the employes of the 10 departments divided into 10 groups, each with a chairman, who is a member of the safety council. The contest attracted widespread attention.

The contest was entitled the "safety horse race" by the employes. Each department had its own horse, which was represented by a figure on a chart consisting of a number of squares. Each square represented a day. For each day in which no accident occurs in a department, the horse representing that department was advanced one day, or a square on the board. The horses had names.

For minor accidents, which were a little too serious for first aid treatment only, one-half day was marked off and for accidents requiring only first aid treatment, the department lost one-fourth of a day. If any employe received a minor injury and failed to apply for first aid, the department was penalized.

Persons who have made a study of the subject claim that the human element is a strong factor in 90 per cent of the accidents and it was for the purpose overcoming this human element problem by making a concerted drive to eliminate accidents that the company established the safety department, with Mr. Sansouci as the director.

The judges were Horace Barber, Edward F. Corbett and Alexander Prevost. Cigars were the prizes.

Kansas Saving $100,000 by Lowered Rate

FREIGHT rate reductions on road materials in Kansas, ranging from 30 to 40 per cent, ordered September 6 by the Kansas Public Utilities Commission, have become effective.

M. W. Watson, state highway engineer, estimates that the reductions will save Kansas counties approximately $100,000 on contracts already awarded, where delivery of materials has not yet been made. On the present rate of road building the state will be saved more than $250,000 a year, according to Clyde M. Reed, chairman of the commission.

In order to protect existing rates on sand and maintain the rate relations between producing districts in the state, maximum rates were set and specific rates previously in effect which are not higher than the maximum rates are left unchanged.

The new rates are based on mileage blocks and the reductions vary from 3 cents on the 40-mile block to 6 cents on the 500-mile block, a 100 pounds.

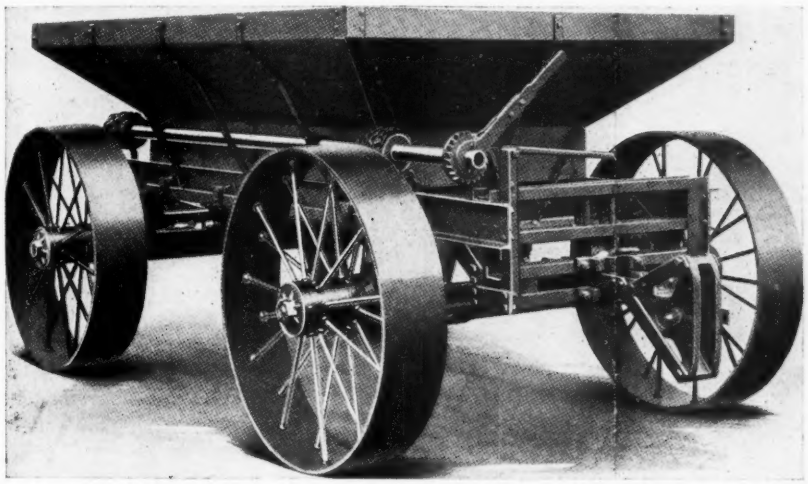
A special rate of 80 per cent of the published schedule for agricultural limestone—used in correcting the acidity of the soil, is made a part of the order. The order was issued after shippers and carriers had failed to agree upon a new rate.

New Machinery and Equipment

A New Trailer Only 62 In. High

THE Miami Trailer Co., Troy, Ohio, has recently placed on the market a slow-speed trailer designated as MR-3. The bearing equipment consists of two large, heavy-duty Hyatt roller bearings in each wheel, revolving in a heavy grease bath retained by dust and sand proof washers. The wheels are steel, 44-in. high, with ⅞-in. spokes and 10x⅝-in. steel tires.

The bottom doors are of No. 10 gauge steel, reinforced lengthwise, hot-riveted hinges, swinging from the outside of the steel channel side members, with an opening of 38x73-in., through which all kinds of materials will instantly drop. The all-steel body is constructed with flared sides and ends reducing the loading height to 62 in., an essential when trailers are to be used with an elevating grader or under a standard loading bin and a convenient height for either hand or steam shoveling.



Type of trailer hauled by a Fordson tractor and having a capacity of 4 yd.

This unit is built in full 3-yd. water-level capacity and is increased to 4 cu. yd. full rounded load. Miami reversible slow speed trailers—drawn by gas or steam tractors—are designed for the most economical transportation of all material.

A slow speed trailer must be constructed with the same intelligent technical supervision given to automotive products. It must incorporate all of the most important features—short wheelbase for quick manipulation in close quarters; low loading height; positive winding and dumping mechanism easily and quickly operative, saving time at points of discharge; large, heavy duty roller bearings to reduce draft to a minimum; reversibility that no time may be lost in turning a train; heavy steel channel side members reinforced and braced that units of from 4 to 8 may be hauled in trains and backed to loading bins or over new work without uncoupling the tractor.

The center of gravity is low, the top of the body being put 18 in. above the top of the wheels, making it impossible to upset the load. Alemite high pressure lubrication is provided for each wheel, making it unnecessary to remove them.

New Features in Dredge Pipe Construction

THE Miami valley flood of 1913, so destructive to life and property, is now history, states D. M. Strickland, research engineer of the American Rolling Mill Co., Middletown, Ohio—one historical incident which will never recur if human effort, inventive ingenuity, and engineering accomplishments can prevent it. The great work of the Miami Conservancy Board is completed. Although many unforeseen difficulties had to be overcome, the engineering features of this accomplishment are distinctive and are worthy of study.

"The engineers used gigantic machinery—steam shovels, crushers, dump cars, bucket cranes, dredge pipe; every modern convenience needed for present-day economic construction. The dredge pipe conveyed thousands of tons of sand, gravel and stones from the source of supply to the point of need. Previous experiences, however, had demonstrated that ordinary steel dredge pipe would not meet such requirements; the sludge and sharp stones moving through the pipe quickly ground away the metal; and the pipes, full of holes, were soon worthless.

"The engineers wanted a dredge pipe which would give maximum service. They brought their problem to the American Rolling Mill Co. and requested the Armco organization to co-operate in perfecting a dredge pipe which would meet their requirements. After metallurgical experiments, chemical analyses and physical testing, the company perfected a new type of dredge pipe, and its special analysis dredge pipe was used.

"The steel analysis was not the only feature considered. Various sizes, constructions and methods of joining the sections were studied; riveted pipe was unsatisfactory because the stones and gravel ground off the rivet heads quickly; double-seamed pipe also had disadvantages. It was decided therefore to so weld the seams that each section would be water and air tight from end to end. Armco welding rod was found to be satisfactory.

"The pipe ends are so made that the sections join with lipped joints and are held in place with hooks, insuring rapid and economical installation and quick movement from place to place at minimum cost. Such flexible joints permit the engineer to lay the pipe in the form of a circular arc so that, for example, it will circle around a hill or other obstruction. It is so easy to handle the dredge pipe line that the pipes can be turned around without disconnecting them, thereby allowing the entire inside surface to uniformly withstand abrasive action. Since no spiral mechanisms are needed the disadvantages attending the use of such devices are eliminated.

"Approximately 30,000 ft. of pipe thus constructed were used by the Miami engineers, and although the original estimate called for 150,000 ft., the long-service life of the special dredge pipe resulted in an approximate 80 per cent saving. Due to the abrasive character of the soil, ordinary riveted steel pipes were worn out after approximately 60,000 cu. yd. of material had been moved. The special welded pipe is still giving satisfactory service, approximately 350,000 cu. yd. of

material having been moved by means of these pipes—400 per cent more serviceable than riveted steel. The saving to taxpayers resulting from the use of this dredge pipe is between $200,000 and $250,000.

"Armco special analysis steel dredge pipe was found to be long lasting and economical to install and therefore becomes another Armco specialty. The Miami engineers voluntarily complimented the Armco organization on its accomplishment; they appreciated the efforts required to perfect this pipe, and for these reasons they so unhesitatingly recommend its use for all dredge-pipe installations."

New Elevating Loader Operated by Tractor

NEW equipment adapting the Fordson tractor to a wider range of industrial work has been put on the market by the Specialty Engineering Co., Philadelphia, its manufacturer.

This Specialty Fordson truck loader is mounted on the tractor and provides a portable outfit with greater power than the conventional stationary outfit at but slight additional cost. In the main, it consists of three parts: The supporting frame, the elevator, and conveyor. The frame attaches to the tractor and supports the loader. The elevator is mounted on the rear and is set at an angle for efficient work. The elevating equipment consists of steel buckets operated by endless chains and working on rollers, the latter being a distinctive feature. The material is lifted by the elevator and delivered to the conveyor which extends across the top of the tractor. The conveying mechanism is of the conventional endless belt type and moves the material forward beyond the front end of the tractor, where it is dumped into trucks or wagons.

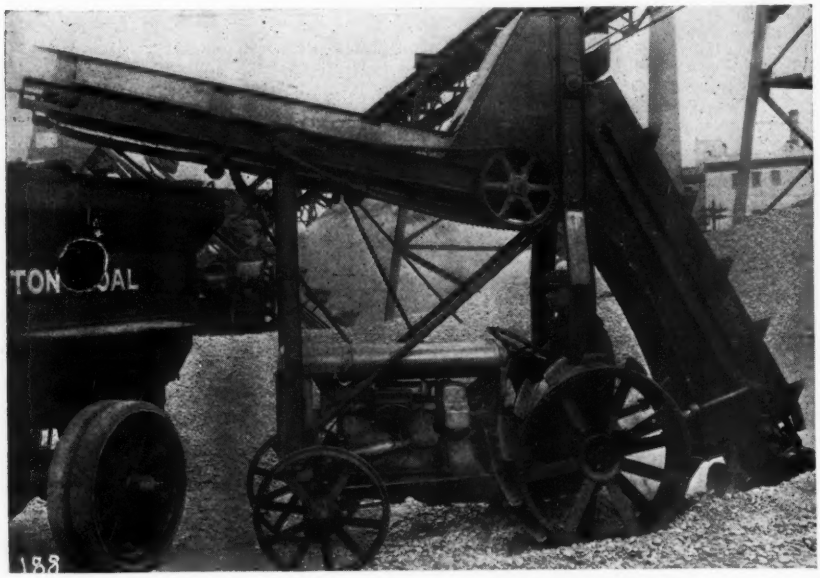
The frame includes four uprights attached to the tractor. The installation is a comparatively simple operation performed in 2 hr. by any reasonably well-equipped service station. The rear supporting members terminate in cast steel saddles strapped around the rear axles in the grooves provided. Each front member is supported by through bolts to the sides of the radiator. This affords rigid, adequate support for the loader and makes it an integral part of the tractor.

The loader is operated from the power take-off shaft of the Fordson, a sprocket wheel being attached to this shaft which, in turn, drives a sprocket on the loader, chain drive being used. The power is transmitted to a countershaft which drives the conveyor and elevator. Similar loaders of the stationary type are operated by 5-hp. engines, which afford ample power. The Specialty loader has been used in work too heavy for stationary types, but none of this work has required more than 10 hp. However, all the power which the engine affords for belt work is available for the operation of the loader.

This loader weighs approximately 5500 lb., 80 per cent of which is carried on the rear axle, the added weight affording greater stability. The loader has sufficient bearing surface and lubrication facilities to assure smooth operation. Flexibility of the elevating and conveying parts absorbs most of the vibration incident to operation, so that the complete outfit runs as smoothly as the tractor itself.

The tractor loading outfit can be easily moved as fast as loading conditions require; it backs into the material to be loaded and the trucks hauling the material are loaded from the front of the tractor. In moving from one job to another the elevator is raised so that it has the same clearance as the tractor. Its over-all height is sufficiently low to permit it moving under viaducts, in and out of service stations, etc.

The loader can be used for any loose material, as sand, gravel, earth, stone, etc.



This elevating loader is operated by and mounted on a Fordson tractor

Alternate Lime and Iron With Alum to Reduce Sand Size

CHEMICAL treatment of the Toledo water supply with lime and iron during the last two months in 1920 and first two in 1921 increased the incrustant deposits on the sand grains by 39 per cent and greatly lowered the efficiency.

In the last annual report it is stated that subsequent alum treatment removed a portion of this coating and rendered the remaining incrustation semi-porous. Upon again changing to an iron-lime treatment in May a cementing action was started which was not thoroughly broken by washing the filters and, aided by the porosity of the sand incrustations, entrained sufficient organic material to become heavy and later start the formation of mud balls in two of the filters. There was no surface indication of this disturbance which caused considerable trouble in July. Large quantities of Bryozoa were deposited on the sides and wash troughs necessitating daily cleaning and scrubbing to effect a removal. These troubles were overcome by a change in the wash methods and were assisted by the use of an alum treatment which was continued until the incrustation was partially removed.

The hardness of the water was comparatively uniform throughout the year although some increase was noted in the filtered water while using an alum treatment which was due to the removal of the filter incrustants.

Explosives Used in August

SALES of explosives in the United States during August for domestic consumption, says W. W. Adams, statistician of the U. S. Bureau of Mines, amounted to 603,842 kegs of black powder, 3,280,800 pounds of permissibles, and 18,114,953 pounds of other high explosives. These figures are based upon manufacturers' reports to the federal Bureau of Mines and represent about nine-tenths of the explosives industry.

News of All the Industry

Incorporations

The **Williams Lime Mfg. Co.**, Wilmington, Del., has been incorporated for $100,000.

The **American Slate Products Co.**, Wilmington, Del., has been incorporated for $300,000.

The **Southwestern Rock and Gravel Co.**, Los Angeles, Calif., has been incorporated for $75,000.

The **Angeles Cement Co.**, Seattle, Wash., has been incorporated for $100,000 by R. Lundvall and N. O'Neil.

The **Centredale Granite Co., Inc.**, Providence, R. I., has been incorporated for $15,000 by W. Greenfield, N. Mishnick and C. M. Robinson.

The **Clover Quarry Co.**, Clover, S. C., has been incorporated by S. N. Stacy, president; J. L. Pursley, vice-president; V. O. Hambright, secretary-treasurer.

The **National Granite Co., Inc.**, Montpelier, Vt., has been incorporated for $50,000 by T. Bauchard, A. J. Willett, T. Beaudet, C. J. Provost and L. Bauchard.

The **Wheeler Lime Mfg. Co.**, Nashville, Tenn., has been incorporated for $200,000 by F. H. Wheeler, H. A. Williams, K. Sparks, W. B. Sneed and W. Hume.

The **Concord Lime Co.**, Concord, Tenn., has been incorporated for $10,000 by H. G. Winfrey, M. L. Winfrey, O. L. White, C. H. Winfrey and Ruth E. Winfrey.

The **Monarch Materials Corp.**, Cape Girardeau, Mo., has been incorporated for $10,000 to mine silica. Incorporators are C. Miller, S. F. Lloyd and U. S. Higdon.

Sand and Gravel

The **Western Washed Sand and Gravel Co.**, Wauwatosa, Wis., is taking bids on erection of a gravel washing plant.

The **Tavern Rock and Sand Co.'s** Klondike, Mo., power plant was recently destroyed by fire. The loss is estimated at $10,000.

The **Warren Sand and Gravel Co.**, Russell, N. Y., is again operating its plant which was damaged by a cloudburst some time ago. The plant has been entirely rebuilt.

Frank D. Eno, Syracuse, N. Y., and a syndicate of local capitalists have purchased the equipment and gravel bed of the Columbia Sand Co., Minetto, N. Y. The new company plans extensive improvements and will purchase new machinery to carry on operations.

The **Eastwood Sand and Gravel Co.**, Graysville, Ill., is constructing a tow-boat to be used in its new plant now under way. The company has a stationary gravel plant two miles south of Graysville and will use the new plant to dig gravel from the bar just north of the city.*

Gypsum

Ludwig, Nev.—Martin Uldhall, financier of San Francisco, has leased the gypsum ground owned by the Nevada Douglas Copper Co., and operations have already begun. A refining plant with a capacity of 150 tons daily will be erected. It is stated on good authority that the deposit has been developed to a point where 3,000,000 tons of gypsum are blocked out.

Cement

The **Superior Portland Cement Co.**, Concrete, Wash., has let the contract for erection of a $97,000 clinker storage building.

The **Security Cement and Lime Co.** will increase the capacity of its plant at Security, Md., 50 per cent. L. A. Cover, Baltimore, Md., is president.

The **Edison Portland Cement Co.**, East Orange, N. J., announces an increase in its employes' wages of five cents an hour. The company employs 600 men.

The **Southwestern Portland Cement Co.**, El Paso, Texas, plans to erect a $1,250,000 plant in Phoenix, Ariz. O. J. Binford is secretary and superintendent.

Quarries

The **Superior Crushed Rock Co.**, Duluth, Minn., has filed articles of dissolution.

The **Hardaway Co.**, Salisbury, N. C., will develop granite quarries at Woodleaf, N. C.

The **Indiana Quarries Co.**, Bedford, Ind., is erecting a new stone mill to replace that of the old Salem mill recently burned.

Roy Dickinson, Inc., El Dorado, Ark., is operating a gravel pit to furnish concrete gravel. The plant is owned by R. H. B. Gibson and Roy Dickinson.

The **John T. Dyer Quarry Co.**, Birdsboro, Pa., has purchased 100 acres of land adjoining its property. The property contains a deposit of trap rock and will increase the supply of the plant.

The **Oklahoma Rock and Asphalt Co.'s** plant, Ada, Okla., has resumed operations after being closed down for some time. The plant is pulverizing about 100 tons a day. J. O. Tipton is the manager.

Independence, Mo.—W. M. Spencer has purchased 113 acres of land at Alton Junction, near Kansas City, and will move his rock crusher to this location. It is estimated the deposit contains 5,000,000 tons of limestone. More machinery will be added to increase the daily capacity.

Arkansas Pass, Texas.—D. M. Picton & Co. have been awarded the contract for furnishing 8000 tons of rock to the government at Port Arkansas to be used in extending the spurs, repairing the north jetty and the St. Joseph dyke. The rock will be brought from the company's quarry at Beckman, Texas.

The **Elsinore Mineral Products Co.**, Elsinore, Calif., which began operations two years ago, reports eight grades of fine granite in its quarries at Cottonwood Canyon. The company has four claims. Limestone, feldspar, limerock, silica, dolomite and gypsum are found in abundant quantities. M. L. Cambern, B. T. Spencer and H. R. Dabney are the owners.

Lime

The **Kittanning Limestone Co.**, Kittanning, Pa., is beginning the erection of a two-story warehouse 25x100 ft.

The **Sterling Stone and Lime Co.** has completed plans for the erection of a structural steel stone-crushing plant to be erected eight miles north of Delaware, Ohio.

The **Waukesha Lime and Stone Co.**, Waukesha, Wis., plans erecting a two-story pulverizing plant, with steel foundation, costing $50,000, to replace the plant recently destroyed by fire.

The **Bessemer Limestone and Cement Co.**, Bessemer, Pa., reports cement shipments have been running at a high rate for the last five months. Expanding business has made necessary the appointment of Charles Schmultz as sales manager, who also becomes assistant general manager in charge of sales.

Big Spring, Texas.—Plans are under way for securing a test for potash in this section. If a sufficient amount of land can be secured in the northern part of Glasscock county and the southern part of Howard county, it is planned to sink a shaft. The U. S. Department of Geology has issued a bulletin concerning potash finding in McDowell well No. 4, in Glasscock county.

Concrete Products

The **Kohm Cement Products Co.** has engaged in business in Jackson, Mich.

The **Escondido Cement Products Co.**, Escondido, Calif., has been incorporated for $10,000.

Obituary

W. B. Williamson, superintendent of the Portland Cement Co., Memphis, Tenn., died recently of a paralytic stroke. He was 69 years old. Mr. Williamson was employed at the Portland plant for six years. He is survived by his widow.

Fred Hyatt McMillin, 42 years old, son of John S. McMillin, president of the Roche Harbor Lime Co., Roche Harbor, Wash., died September 23, after an illness of three months. He is survived by a son, Paul H., and a daughter, Dorothy H., and his parents, Mr. and Mrs. John S. McMillin.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912,

Of ROCK PRODUCTS, published every other week at 542 S. Dearborn St., Chicago, Ill., for October 1, 1922.

State of Illinois, County of Cook, ss.

Before me, a Notary Public, in and for the State and County aforesaid, personally appeared George P. Miller, who, having been duly sworn according to law, deposes and says that he is the Manager of ROCK PRODUCTS and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Tradepress Publishing Corp.; Editor, Nathan C. Rockwood; Managing Editor, Nathan C. Rockwood; Business Manager, George P. Miller, all at 542 S. Dearborn St., Chicago, Ill.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock.) Tradepress Publishing Corp.; individual stockholders: W. D. Callender, T. J. Sullivan, Geo. P. Miller, N. C. Rockwood, W. B. Mayor, D. R. Hicks, A. H. McQuilkin, H. P. Sessions, C. O. Nelson, all at 542 S. Dearborn St., Chicago, Ill.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) There are none.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is—(This information is required from daily publications only).

GEO. P. MILLER,
Business Manager.

(SEAL)

Sworn to and subscribed before me this 23d day of September, 1922. Charles O. Nelson, Notary Public. (My commission expires April 6, 1926.)

Classified Advertising

Rates for advertising in the Used Equipment Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Please send check with your order. These ads must be paid for in advance of insertion.

BIDS WANTED

on quarrying 400,000 cubic yards of limestone. Quarry is open and will take the rock as fast as turned out. Performance bond will be required. For further information address

411 Cotton Exchange Building
Houston, Texas

POSITION WANTED

First class executive with 25 years' practical experience in the lime and quarry business is open for a position as manager or general superintendent where results will count. Would prefer opening where an interest could be secured, either by purchase or strict attention to business. Address

Box 1591, Care of Rock Products
542 South Dearborn Street Chicago, Ill.

WANTED

To correspond with some cement or stone company in regard to position as quarry foreman. Had years of experience in large quarries. Can produce the goods. Best of references.

GEORGE HORTON
P. O. Box 447 Sedan, Kansas

POSITION WANTED

Civil Engineer, graduate of large Western University, age 30, former army officer, employed for six years with present company, wishes to change locations and make connections with some Rock Products Industry in executive or promotional position. Would like to correspond with anyone interested. Address

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542 South Dearborn Street, Chicago, Ill.

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Superintendent desires engagement; thoroughly familiar with all details of sand and gravel plants. Twenty years' experience with steam and electric dredges. Can give the best of references. Address

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542 South Dearborn Street Chicago, Ill.

Take advantage of the Opportunity offered in the Used Equipment Department to dispose of the equipment that you no longer need.

George Borrowman, Ph.D.
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Analyses, consultations, researches in connection with rock products, cements, clays, lime, plasters, zeolites, sands, etc.

9 So. Clinton St. Chicago, Ill.

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(Est. 1905)
Consulting and Analytical Chemist

Specialist in Analysis of Rock Products

Chemical Bldg. St. Louis

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Situation as manager or superintendent of works. Thoroughly experienced in the manufacture of portland cement, fertilizers, and agricultural limestone. Have given special attention to organization. Technically trained. Address

Box 1588, care of Rock Products
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WANTED
42" Fuller Mill

This mill must be in good condition and guaranteed.

WISCONSIN LIMESTONE CO.
1102 First Wisconsin Nat. Bank Bldg.
Milwaukee, Wis.

Used Equipment

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FOR SALE

Two No. 4 Semi-Vulcanite Williams Crushers at $1400.00 each, and two No. 5 McCulley Gyratory Crushers at $1500.00 each. All second hand but guaranteed to be in good condition.

Dewey Portland Cement Co.
Dewey, Oklahoma

FOR SALE

2 8x110′ Rotary Kilns
6 5x6x7x110′ Rotary Kilns
8 5x21′ Tube Mills, Steel Lining
6 250 H.P. Oil City Water Tube Boilers
1 4′ 6″ x 40′ Coal Dryer
1 No. 5 Gates Crusher
8 Krupp Ball Mills
4 Engines, 200 to 500 H.P.
8 33″ Fuller Mills

Shafting, Pulleys, Bearings and Elevator Equipment, all in first-class operating condition.

50 Acres of Land and Five Buildings, Stone and Steel Construction.
Located at Stockertown, Pa.

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OLLIE LAWRENCE, Stockertown, Pa.

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Immediate Delivery

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No. 18K GATES CRUSHER.
50-75 HP. Single Drum Hoists, 25 Cy. Motors.
25-50-80-110 HP. Electric Hoists.
Nos. 4-5-6-7½ & 9 CRUSHERS.
6 and 12 ton Gasoline Locomotives.
10x12 in. Steam Hoist, 3 Drum.
2-DISC CRUSHERS, 36-in. SYMONS, also 24-in.
100 TON 2¼-YD. ELEC. SHOVEL.
50 to 5000 ft. Steam, Belt & Elec. Compressors.
JAW & ROLL CRUSHERS.
10-15 & 20 ton Locomotive Cranes.
13x30, 10x18, 9x14-in. and Other Jaw Crushers.
24x54 McCLANAHAN ROLL CRUSHER.
Columbus Portable Conveyor 25-ft. Eng. Drive.
Send us your inquiries for Engines, Centrifugal Pumps, Quarry & Contrs. Equip., Etc.

ROSS POWER EQUIP. CO.
Indianapolis, Ind.

QUARRY EQUIPMENT

4—20 yd. Steel Underframe Side Dump Cars.
3—16 yd. Steel Underframe Western Dump Cars.
10—1½ yd. Western Dump Cars.
2—10x16 Davenport 36 in. ga. Saddle Tanks.
1—11x16 American 36 in. ga. Saddle Tank.
1—9x14 Porter 4 ft. 8½ in. ga. Saddle Tank.
1—¾ yd. Thew "O" Traction Shovel.

Walter A. Zelnicker Supply Co., St. Louis

WANTED TO BUY

No. 3 or No. 4 Keystone excavator or small Erie shovel. Give full description and lowest cash price.

York Valley Lime & Stone Co.
York, Pa.

FOR SALE

One Broughton Plaster Mixer, Style B, No. 2. This machine has never been used. Write us.

THE SPEAKES COMPANY
415 North Griggs Street St. Paul, Minn.

FOR SALE

24" Symons Disc Crusher, never been used.

Breen Stone & Marble Co.
Kasota, Minnesota

Machinery For Sale

DRYERS—Direct-heat rotary dryers, 3x25', 3½ x25', 4x30', 5½x50', 6x60' and 7x60'; double shell dryers, 4x20', 5x30' and 6x35'; steam-heated air rotary dryers, 4x30' and 6x30'.

KILNS—Rotary kilns, 4x40', 5x50' and 6x70', 6x100', 7x80' and 8x110'.

MILLS—6x8', 6x5', 5x4', 3x3½' pebble and ball mills; 3' March mill; 42", 33" and 24" Fuller-Lehigh mills; 4½x20', 5x11', 5x20', 5½x22' and 6x20' tube mills; 7½x13", 9x15", 16x10" and 12x26" jaw crushers; one "Infant" No. 00, No. 0, No. 2, No. 3, and No. 9 Williams' swing hammer mills; one Kent type "G" mill; 24", 36" and 40" cage mills; 3' and 4½', 6' and 8' Hardinge mills; 18x12", 20x12" and 30x10" roll crushers; No. 0, No. 1 and No. 3 Sturtevant rotary crushers; one No. 2 Sturtevant ring roll crusher; 5 roll and 2 roll No. 1 and No. 000, No. 00 and No. 0 Raymond mills; one No. 3 and No. 4 and No. 7½ Telsmith breaker; one 36" Sturtevant emery mill; one 3 roll Griffin mill; 60" chaser mill.

SPECIALS—Five automatic package weighing machines; jigs; 6x8', 6x5' and 4x3' Newaygo vibrating screens; Richardson automatic scales; 8' and 10' Emerick air separators.

Air compressors.

W. P. Heineken, Engineer
95 Liberty Street, New York. Tel. Cortland 1841

Mine Cars, Rails and Ties

We have mine cars in stock for all purposes. Also rails 12 lb. to 100 lb. section. Spikes, bolts, frogs and switches. All trade is solicited and prices cheerfully quoted.

M. K. FRANK
Frick Building Pittsburgh, Pa.

FOR SALE

Three Roll Bradley Pulverizer, complete with number of extra parts. In first class condition. A REAL BARGAIN. Write

P. O. Box No. 342, Geneva, N. Y.

FOR SALE

Monarch Corliss Engine, Rolling Mill Type. Cylinders 20"x42". Diameter Flywheel 14 ft. Built for 78 R.P.M. Engine is in good condition.

JACKSON & CHURCH CO.
Saginaw, W. S., Mich.

1—59-ton standard gage Baldwin 6-wheel saddle tank switcher.
1—39-ton Baldwin 6-wheel switcher with separate tender.
1—50-ton standard gage Brooks 6-wheel switcher.
1—42-ton standard gage Shay geared locomotive.
2—18-ton 36-in. gage 4-wheel saddle tanks.
1—23-ton new 36-in. gage Porter 6-wheeler, with tender.
1—20-ton Industrial Locomotive crane.
1—14-B Bucyrus steam shovel, mounted on traction wheels.

Birmingham Rail & Locomotive Co.
Birmingham, Ala.

FOR RENT AND SALE

14—4-yd. 36-in. ga. heavy duty Western dump cars.
20—12-yd. Western air dump cars, std. gauge.
50—60,000-lb. capacity flat and box cars.
1—Western standard gauge spreader, used sixty days.
1—Osgood 18 revolving shovel, traction wheels, No. 794, ¾-yd. bucket, built 1920.
1—Marion 76 steam shovel, No. 3503, std. gauge, weight 110 tons, used 10 months.
1—Class 14 Bucyrus dragline on caterpillars, 70-ft. boom, 2-yd. bucket, built 1921.
2—Foote 40-S 1-yd. side discharge concrete mixers, with steam engine and boiler.
32—NEW 20-in. I beams, 80 lbs. per foot, 40 feet long, not drilled.
1—NEW Lakewood concrete chuting system.

LOCOMOTIVES

1—50-ton 18x24-in. six-wheel switcher.
1—40-ton 17x24-in. four-wheel switcher.
2—NEW 24-ton six-wheel Porters, separate tender, 36-in. gauge.
2—18, 14 and 10-ton Vulcans, 36-in. gauge.

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McCormick Building Chicago, Illinois

WANTED

Second-hand Kritzer or Clyde Hydrator; also Raymond Pulverizer and Air Separating System. Must be in good condition. Reply

G. & W. H. CORSON
PLYMOUTH MEETING, PA.

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CABLEWAYS
DREDGING MACHINERY

A Flory Hoist for Every Purpose

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BANGOR, PENNSYLVANIA

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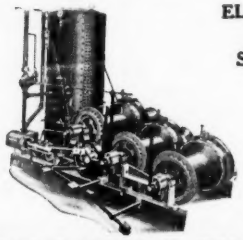
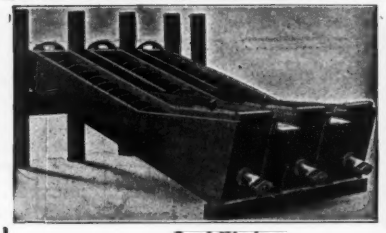
TRADE MARK
MUNDY
ESTABLISHED 1869

DERRICKS — GUY AND STIFF LEG — ELECTRIC AND STEAM — HOISTS



J. S. MUNDY HOISTING ENGINE CO.
NEWARK, N. J., U. S. A.



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9-Foot Dry Pan

Lewistown Foundry & Machine Co.
LEWISTOWN, PA.

Builders of heavy duty crushers and glass sand machinery. Glass sand plants equipped complete.

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Automatic Aerial Tramway

Assures *Increased*
TONNAGE
EFFICIENCY
EARNINGS

Let Us Demonstrate

Interstate Equipment Corporation
25 Church Street
New York City

THE McMYLER

THERE is power built into each machine, a ruggedness that can be depended on to stretch out into months and years of flawless service.

Try out the Type "J" Locomotive Crane and its operation will convince

THE McMYLER INTERSTATE CO.
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BRANCH OFFICES:

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Chicago, Ill., 812 Edison Bldg.
Seattle, Wash., Hoge Building
Denver, Colo., 18th and Wazee Streets
San Francisco, Calif., 766 Folsom Street
New Orleans, La., 444 Maison Blanche Annex
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Boston, Mass., 261 Franklin St.

WHEN in the market for machinery or equipment, look through the advertisements of ROCK PRODUCTS. If you do not find what you want advertised in this issue, write us and we will put you in touch with reliable firms who can supply your need. This service is free to our readers. Use it.

Rock Products

The Nation's Business Magazine of the Rock Products Industry

542 South Dearborn Street
Chicago, Illinois

THE STANDARD OF EXCELLENCE

BALDWIN

Industrial and Contractors' LOCOMOTIVES

are in use where dependable motive power is required.

Full information upon request

The Baldwin Locomotive Works
PHILADELPHIA

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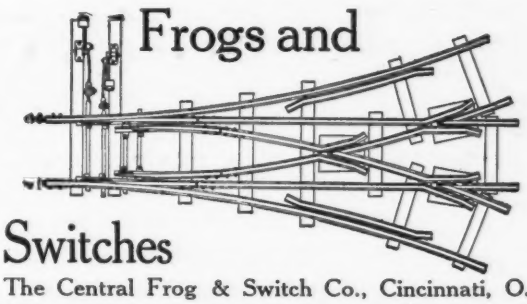


The Central Frog & Switch Co., Cincinnati, O.

Frogs, Switches, Crossings, Switch Stands, Rails, Angle Bars, Fish Plates, Throws, Rail Braces, Tie Plates, Portable Track, Etc., Etc.

TrucKranE

A Proven Crane With a New Mounting

The Byers "Truckrane" is our standard Model "1" Auto-Crane arranged to fit a 5-ton truck. Its increased "movability" on the job, together with time saved between jobs, is opening new fields for crane service. Ask for "Truckrane" Bulletin.

THE BYERS MACHINE COMPANY
310 Sycamore St., Ravenna, Ohio

Builders of Full Circle Cranes, Auto-Cranes, Buckets, Hoists, Etc.

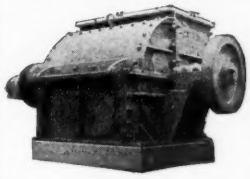
Type 31, 6-ft HUM-MER

HUM-MER *Electric* SCREEN

Makes screening and crushing more profitable. Screens any material, wet or dry, from 2½" opening to minus 200 mesh.

Send for Catalogue 45-R

THE W. S. TYLER COMPANY
CLEVELAND, OHIO
Manufacturers of Woven Wire Screens and Screening Equipment



Gruendler Hercules Crushers

Gruendler Hercules Crushers are reducing production costs in hundreds of plants throughout the country.

"America's Famous Crushers"

For Crushing and Pulverizing Limestone, Lime, Gypsum, Shale, etc., a Gruendler cannot be beat.

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908 North Main Street St. Louis, Mo.

Electric Motors and Generators

for all requirements of the Rock Products Industry

BURKE ELECTRIC CO.

Main Office and Works
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Service Sales Offices

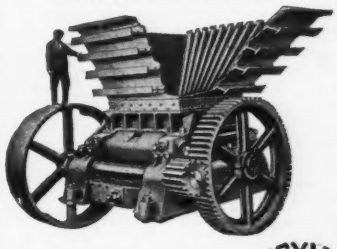
Buffalo, New York — Cleveland, Philadelphia — Detroit, Pittsburgh

Sales Agencies
Underwood Electric Co., Cincinnati
W. T. Osborn, Kansas City

BACON~FARREL ORE & ROCK CRUSHING~WORLD KNOWN ROLLS~CRUSHERS

EARLE C. BACON, INC. ENGINEERS
26 CORTLANDT ST., NEW YORK

"PENNSYLVANIA" Single Roll Crusher



The New Series of "Pennsylvania" Single Roll Crushers take steam-shovel feed of limestone, cement rock, gypsum and similar materials, — wet and sticky, — without feeder, and make maximum reduction in one operation. All parts readily accessible. Maintenance cost lower per ton than for any other type. Massive construction — Reliable Safety Devices — Convenient adjustment. Capacities 5 to 450 tons hourly.

Put Your Reduction Problems Up to Us

PENNSYLVANIA CRUSHER COMPANY
Stephen Girard Bldg., Philadelphia

New York
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ROBERT W. HUNT & CO.

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Inspection New and Second Hand Machinery, Pumps, Crushers, Steam Shovels, Cars, Locomotives, Rails and Quarry and Contractors' Equipment

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F. L. SMIDTH & CO.
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CEMENT MANUFACTURING PLANTS
CEMENT MAKING MACHINERY
PULVERIZED COAL INSTALLATIONS
GRANULATING AND PULVERIZING MACHINES FOR ALL MATERIALS
FLINT PEBBLES—SILEX LINING
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WE DESIGN AND EQUIP COMPLETE PLANTS

for the manufacture of gypsum products, such as wall plaster, moulding plaster, wall board products, gypsum block products, also mixing plants.

We are prepared to furnish complete machinery-equipment and design and furnish plans for the installation. Consult our Engineering Department. Forty years' experience in designing of wall plaster machinery and plants.

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World famous for shafting and machinery lubrication!

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"All Men Know It
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At Your Dealers!

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708-710 Washington St., New York

A MARK known and respected around the world — Since 1868 — for fair dealing, a quality product and an unexcelled service

Free Service to Readers of

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If you are in the market for any kind of machinery, equipment or supplies, or if you desire catalogs, information or prices on any product, we are at your service—to obtain for you, without expense, catalogs, prices or specific information on every kind of machinery, equipment and supplies—or to help you find the hard to find source of supply.

RESEARCH SERVICE DEPARTMENT
ROCK PRODUCTS, 542 So. Dearborn St., Chicago, Illinois

Please send me catalogs and prices concerning the following items:

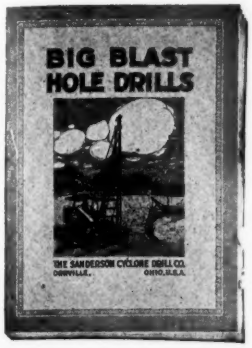
.....

.....

Name.....

Address.....

City..... State.....



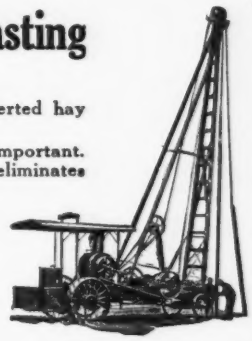
Analyze Your Drilling and Blasting

Our new Blast Hole Catalog B-46 (96 pages) will help you.

The day of poking a hole down with a rivet header or a converted hay bailer is past.

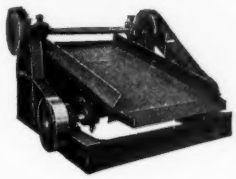
Drilling, being the first step in stone production, is the most important. One cent or one-half cent per ton cost saved in this operation often eliminates competition.

With Cyclone No. 14 Drills on the job and Cyclone Service in reserve, your drilling and blasting troubles fade—and your costs will be right.



THE SANDERSON-CYCLONE DRILL CO.
Orrville, Ohio
Eastern and Export Office, 30 Church St., New York

A ROBINS PERFEX SCREEN



will screen your SAND and GRAVEL, better and cheaper than any other screen. IT IS ABSOLUTELY FREE FROM VIBRATION, and takes but little power.

Write for Bulletin No. 58-R

ROBINS CONVEYING BELT CO.
New York Chicago Pittsburgh Boston

SAUERMAN DRAGLINE CABLEWAY EXCAVATORS

dig, convey, elevate and dump in one operation

Cost data furnished by prominent gravel producers who are using Sauerman equipment backs up our claim that sand and gravel can be excavated and conveyed from pit to plant by one of our drag-line cableway excavators at a lower cost per ton than by using any other equipment or combination of equipment.

Write for Catalog No. 7

Sauerman Bros.
1140 Monadnock Bldg.
Chicago
Also Mfrs. of Power Scrapers

Take the "Hand" Out of Handling

Use an O. S. Dependable Crane

and increase your profits by reducing your costs.

Catalogues 18 and 21 should be in your files.

Sent Upon Request

Orton & Steinbrenner Co.
Main Offices
608 So. Dearborn St.
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Shops—Huntington, Indiana

PERFORATED SCREENS and Steel Plate Work

W. TOEPFER & SONS COMPANY
Milwaukee Wisconsin

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Rock Products

The Nation's Business Magazine of the Rock Products Industry

542 So. Dearborn St. Chicago, Illinois

CARS

WE MAKE CARS FOR COAL, ORE, STONE, SAND, GRAVEL, CLAY AND BRICK. DRYER AND INDUSTRIAL CARS. THE WATT FACTORY IS THE LARGEST IN THE WORLD DEVOTED ALONE TO CAR BUILDING OVER 50 YEARS' EXPERIENCE

CATALOGS

The Watt Mining Car Wheel Co.
BARNESVILLE, OHIO

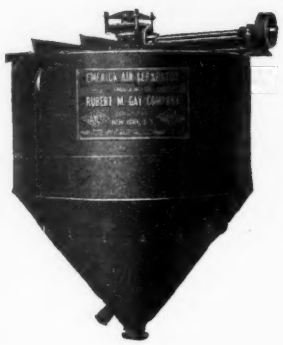
Schaffer Poidometer

These machines have attained a wonderful reputation, built on the solid foundation, MERIT. They are absolutely accurate in every detail, weighing and regulating the flow of materials traveling in a continuous stream over a conveyor.

They can be used to unite different materials in the correct proportion, feed materials to mixing machinery, deliver predetermined quantity of materials to pulverizing or grinding machinery, feed powdered coal in the correct number of pounds per minute, load materials into cars or vessels, and give a record of the quantity loaded, or assemble materials in batches with correct amount of each material.

SCHAFFER ENGINEERING & EQUIPMENT CO.
2828 Smallman Street
Pittsburgh, Pa.

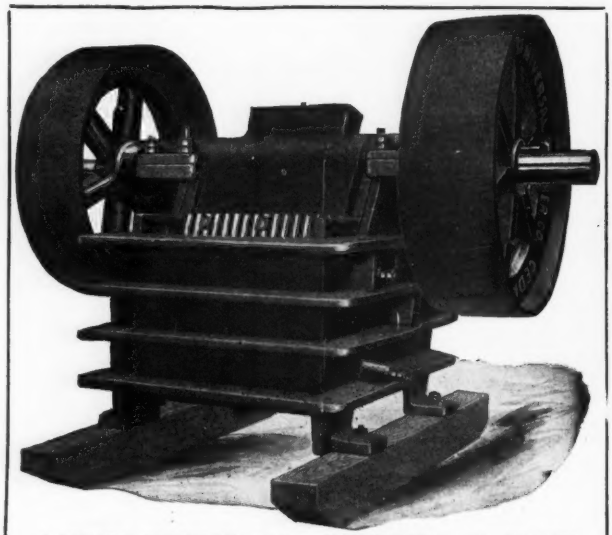
GAYCO-EMERICK
CENTRIFUGAL
AIR SEPARATORS



A Dependable "AIR-SCREEN" for sizing Fibrous, Flaky or Granular Materials. The Only Air-Separator for fine ABRASIVE PRODUCTS

60 mesh to 350 mesh

RUBERT M. GAY COMPANY
114 Liberty St., New York, N. Y.

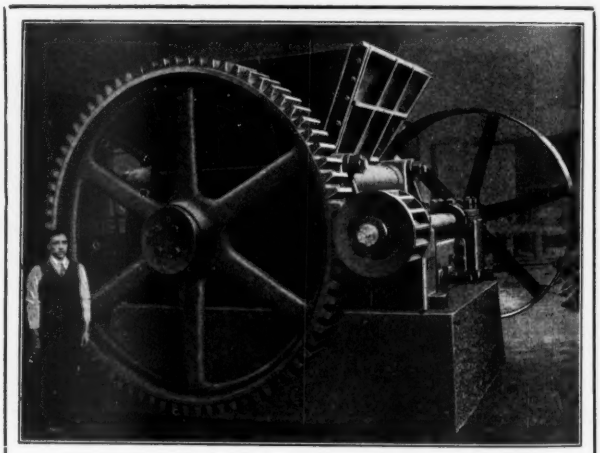


UNIVERSAL STEEL LINE
THE PERFECT GRAVEL AND REJECTION CRUSHER

Sizes up to 8"x36". Capacities 20 to 200 tons daily. Crushes to ¾" and finer if desired. Has no superior for FINE CRUSHING and UNIFORMITY of product.

STRONG LIGHT DURABLE ECONOMICAL

UNIVERSAL CRUSHER CO.
225 Third Street Cedar Rapids, Iowa, U. S. A.

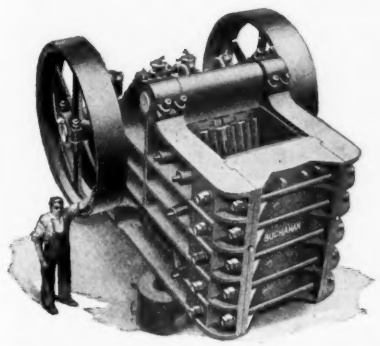


If you had seen the McLanahan Single Roll Crusher before ordering your first Gyratory or Jaw Crusher, you would now be running only the McLanahan Crushers.

After many years' practical experience building and operating other crushers, we brought out the first Single Roll Crusher, proved it best, simplest and most economical—making least fines—requires but little head room—no apron or hand feeding—takes wet or slimy material.

Capacity, 5 to 500 Tons Per Hour

McLanahan-Stone Machine Co.
Hollidaysburg, Pa.
Screens, Elevators, Conveyors, Rock Washers, Etc.



Buchanan All-Steel Crushers

TYPE "C" JAW CRUSHER

Illustration shows Buchanan "All-Steel" Jaw Crusher, with frame of reinforced construction, intended for heavy and continuous duty encountered in large operations.

Jaw plates are made sectional. Upper and lower plates are interchangeable, increasing wear obtainable.

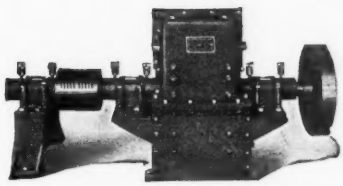
Steel-castings are carefully annealed and all shrinkage strains are entirely removed. Bearings have double system of lubrication, are water jacketed, and in the larger sizes are removable.

Built in sizes from 24 in. x 36 in. to 66 in. x 84 in. Write for bulletin No. 10.

Small Crushers. Crushing Rolls. Complete Crushing Plants.

C. G. BUCHANAN COMPANY, Inc.
Cedar and West Streets, New York City

"K-B" ALL-STEEL PULVERIZER



High Production
Low Power Cost

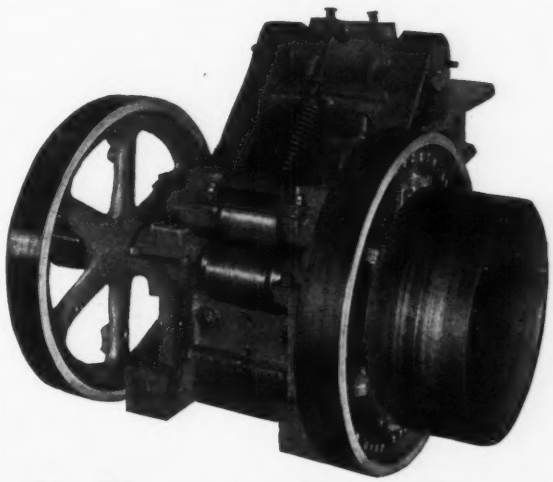
The efficiency of any machine lies in its ability to do a large amount of work with a small consumption of power.

The "K-B" does this!

Ask us for full information

K-B PULVERIZER

K-B Pulverizer Company, Inc.
92 Lafayette Street, New York



Reliance Crushers

IN ALL SIZES FOR EITHER PORTABLE PLANTS FOR ROAD BUILDING OR STATIONARY QUARRY INSTALLATIONS.

BUILT FOR LONG, HARD SERVICE—WILL SAVE YOU MONEY IN THE LONG RUN

Let us quote you prices

Universal Road Machinery Co., Kingston, N. Y.

Branches in all principal cities in U. S. and Canada
MANUFACTURERS OF THE FAMOUS RELIANCE LINE OF ROAD BUILDING AND QUARRY EQUIPMENT

STURTEVANT "ONE-MAN ONE-MINUTE" "OPEN-DOOR" MACHINERY

Crushing, Grinding, Pulverizing,
Screening, Sizing, Air Separating, Mixing,
Weighing, Elevating and Conveying Machinery
Complete Units -:- -:- Engineering Service

STURTEVANT MILL CO. HARRISON SQUARE BOSTON, MASS.

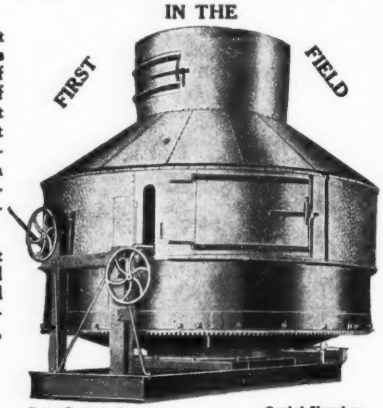
The Clyde Lime Hydrator Performance Counts

The Clyde was first in the field, and through dependable and economical performance is still first choice of lime operators.

The Clyde Hydrator produces big capacities of lime at only three-fifths the cost of any other hydrator on the market.

IN THE

The Clyde not only produces over 90% of the hydrate of America, but makes the best quality of finishing lime from either high calcium or magnesium.

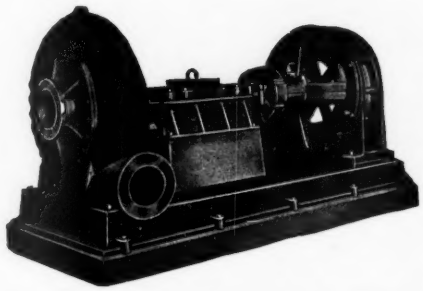


Simple, easiest to operate and most economical in cost of installing, maintaining, and operating.

Send for Catalog

Date Patented	Serial Number
April 3, 1900	646544
October 10, 1905	801329
November 29, 1921	1398238

H. MISCAMPBELL
Patentee and Sole Manufacturer
DULUTH - - MINNESOTA



Heavy Service Dredging Pump

Where conditions are too severe for our standard sand pump, the above type is recommended.

It is built in sizes from 4 in. up, arranged for belt, motor, or engine drive.

MORRIS MACHINE WORKS
50 Genesee St. Baldwinsville, N. Y.

39 Cortlandt St., New York City
Forrest Bldg., Philadelphia, Pa.
217 N. Jefferson St., Chicago, Ill.
Penobscot Bldg., Detroit, Mich.

Bulletin No. 19-B fully describes our complete line of sand and dredging pumps. Have you your copy?

MORRIS

Since the Civil War Builders of Centrifugal Pumps, Hydraulic Dredges, and Steam Engines

GEARS

SMOOTH running; correct in design, accurate and true to pitch, Caldwell gears are bound to please you. We make all types—machine-molded, cut tooth, mortise gears, worm gears, etc. Learn more about Caldwell-Link-Belt Service.

Let us figure with you next time you are in the market.

H. W. CALDWELL & SON CO. LINK-BELT COMPANY, OWNER
Dallas, Texas, 709 Main Street—Chicago, 17th Street and Western Ave.—New York, Woolworth Bldg.

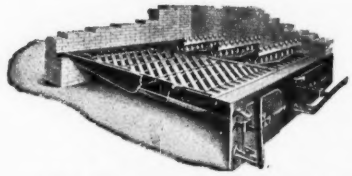
CALDWELL

McGINTY GRATES

The true economy of this grate comes from its ability to stay right, to continue to give the utmost in service for the very least in repairs and overhauling.

The ability to withstand a higher degree of heat than any other grate on the market, is one proven point of superiority; and the greater air area, permitting a deeper bed of fuel, is the final answer to efficiency.

The McGinty is a shaking, dumping and sifting grate, and the fire can be cleaned with closed doors.



Send for descriptive matter and prices

The Kramer Bros. Foundry Co.
Dayton, Ohio

Perforated Steel Screens

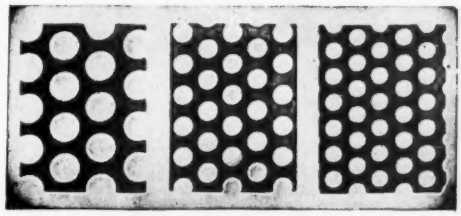
The success of any house supplying repair and renewal parts depends on furnishing what is needed quickly and correctly, and of satisfactory quality.

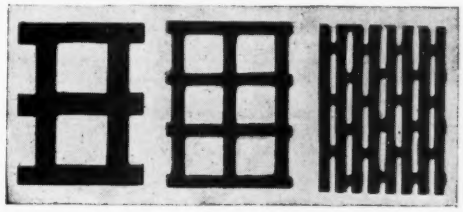
Sixteen years in the Perforated Metal field have given us the experience, equipment and technical knowledge and three hundred tons or more of Steel Plates and Sheets enable us to fill rush orders promptly.

Try us with your next order.

Cross Engineering Company, Offices and Works, Carbondale, Pa.

Perforated Steel Screens





For Screening Stone, Gravel, Sand and Cement

All sizes and shapes of holes in metal of proper thicknesses to give the best screening results.

Sheets furnished flat or rolled to shape for revolving screens.

THE HARRINGTON & KING PERFORATING CO.

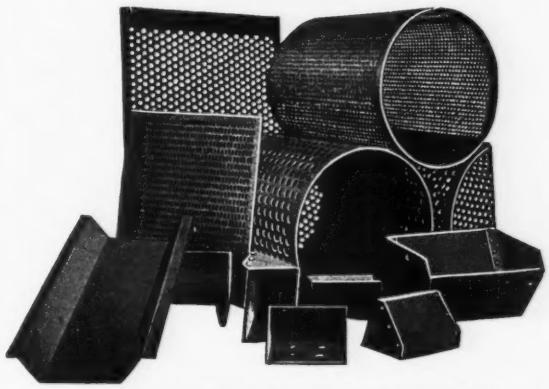
621 N. Union Ave., Chicago, Ill.

NEW YORK OFFICE: 114 Liberty St.

Perforated Metal Screens

FOR

Stone, Gravel, Sand, Etc.



ELEVATOR BUCKETS

PLAIN AND PERFORATED

General Sheet and Light Structural Work

"Light and Heavy Steel Plate Construction"

HENDRICK MFG. CO.

CARBONDALE, PA.

New York Office, 30 Church Street
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The Kritzer Continuous Lime Hydrator

HYDRATE

Years ago we helped our customers create a demand for their hydrate. Today the demand exceeds the supply. That's why every lime manufacturer should have an efficient, economical hydrating plant.

THE KRITZER Continuous Lime Hydrator is efficient in production and economical in operation and maintenance. Let us investigate exhaustively the local conditions peculiar to your proposition, and then apply our experience of many years and design a plant to meet those conditions.

A KRITZER plant, scientifically adapted to your conditions, will give you the best product at lowest cost

THE KRITZER COMPANY

503 South Jefferson Street CHICAGO, ILL.

THE
Haiss Loading Machine
The One Man Loader

It walks right into the pile under its own power, sweeps everything in front of it into the buckets, and leaves behind a ***clean*** path, wider than the machine itself.

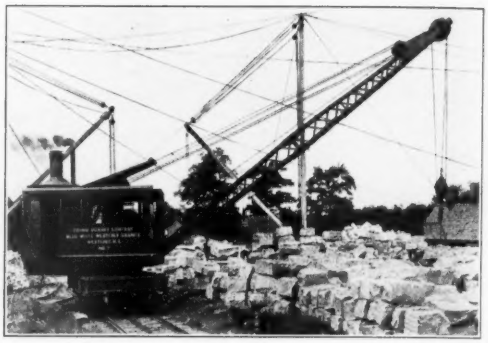
Write for Bulletin No. 521 and get the whole story. It's worth hearing

The George Haiss Mfg. Co., Inc.
139 St. & Park Ave.
NEW YORK

TRUCK LOADERS

HAISS
MATERIALS-HANDLING EQUIPMENT
CLAM SHELL BUCKETS

PORTABLE BELT CONVEYORS

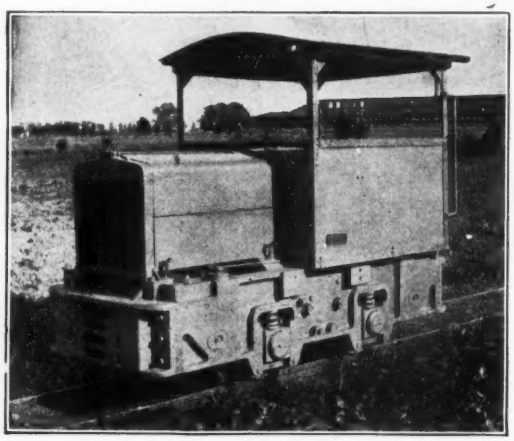


Locomotive Cranes bought for use around quarries and sand and gravel plants usually have a busy life cut out for them. No more expensive mistake could be made than to buy a machine for such service on a purely cost basis. After a locomotive crane is bought and installed and the routine of the plant adapted to it the efficiency of the whole operation slumps every time the crane is laid up for repairs.

"AMERICAN" Locomotive Cranes are the "class" of the field—cheapest in the long run.

AMERICAN
HOIST & DERRICK CO.
Saint Paul, Minn.
New York - Chicago - Pittsburgh - Seattle - New Orleans - Detroit

WHITCOMB LOCOMOTIVES



QUARRIES—CEMENT PLANTS—BRICK PLANTS

The success of Whitcomb locomotives in hundreds of plants speaks of their thoroughness of design and construction and dependability in time of need. We would be glad to tell you what they are doing for others.

Whitcomb locomotives are designed to work and built to overwork

WRITE TODAY FOR BULLETINS

GEO. D. WHITCOMB COMPANY
Rochelle, Ill., U. S. A.

AMERICAN GASOLINE LOCOMOTIVE

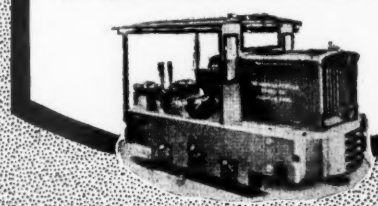
An Ideal Machine to Produce Continuous Haulage at Minimum Cost

If you have haulage work to do, let the Gas-O-Motive do it. The engine is so simple in construction, so ruggedly built, that it can go through the severest service—service that would put other apparatus out of commission—and come out ready for the next job. "Gas-O-Motives" rarely visit the repair shop.

If you have a haulage problem send us your name and address.

"Over a 2,000 foot grade, ranging from 5 to 7 percent, the American Gasoline Locomotive hauls two cars of 2½ yard capacity each, and does it constantly. It works perfectly." Okmulgee Brick Co., Okmulgee, Okla.

THE HADFIELD-PENFIELD STEEL CO.
George G. Stein, Mgr. Gasoline Locomotive Sales Dept.
404 Hippodrome Bldg. CLEVELAND, OHIO



The One Man Excavator

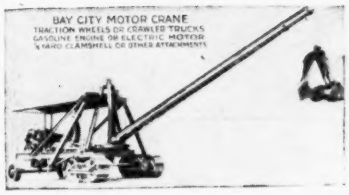
A light, low-priced excavator and loader for sand and gravel pits.

Operates Dipper or Clamshell

Caterpillar or track mounting. Gasoline or electric motor. One man operated handles 25 to 40 yards per hour. Average operating cost per day $8.00 including operator. Displaces ten or a dozen men. Soon pays for itself.

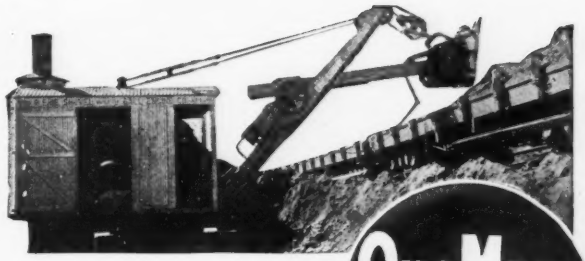
A Caterpillar Mounted Power Shovel for Less Than $3,000

Load your trucks, wagons, or screens with the Bay City. You don't need a high priced shovel for this work. The Bay City costs less to purchase and operate and it will do your work.


BAY CITY MOTOR CRANE
TRACTION WHEELS OR CRAWLER TRUCKS
GASOLINE ENGINE OR ELECTRIC MOTOR
¾ YARD CLAMSHELL OR OTHER ATTACHMENTS

Builders of the Bay City Crane

BAY CITY DREDGE WORKS
2800 Center Ave.
BAY CITY, MICH.



One Man; 350 Tons

When you require an output of 800 to 1,000 tons of sand or gravel per day, a fireman is needed in addition to the steam shovel operator. But when you are getting out 350 tons a day, or less, one man can often both operate and fire an ERIE Shovel. The Cumberland Sand Co., of Cumberland, Md., write us:

"Our labor cost is only a trifle; one man operates and fires our ERIE and keeps it in repair. The saving of labor means more efficiency, and our output has increased considerably. To any prospective purchaser, we recommend the ERIE."—**A. K. Smith, Manager.**

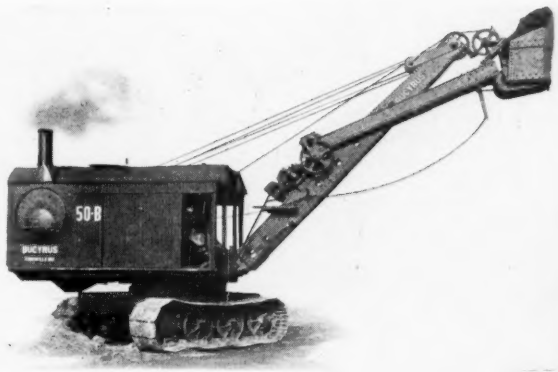
Every ERIE Shovel easily and quickly changed over to Locomotive Crane to handle clamshell bucket.

The ERIE is very strongly built; gives steady service in hard work. Its output compares VERY FAVORABLY with that of larger and more costly shovels.

We will be glad to send you a bulletin showing just what the ERIE Shovel can do. Write for Bulletin P-16.

Erie Steam Shovel Co., Erie, Pa., U. S. A.
Builders of ERIE Steam Shovels and Locomotive Cranes

ERIE Revolving Shovels



A New Shovel for Quarry Work

Bucyrus 50-B Shovel-Dragline

As a shovel equipped with 1¼ to 2-yd. dippers, and 26, 30 and 33-ft. booms.

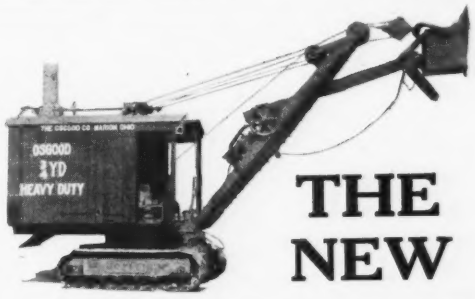
As a dragline with 45 to 60-ft. booms and 1½ to ¾-yd. buckets. Also as a clamshell machine, crane, etc.

SEND FOR BULLETIN C-501-P

BUCYRUS

Bucyrus Company, South Milwaukee, Wis.

488



THE NEW OSGOOD

The OSGOOD ¾ yd. Heavy Duty has an instant responsiveness—a snap in action—an easy confident manner of tackling the toughest job—imparting no sensation of working to the limit of strength—qualities that can only result from abundant vitality and reserve strength.

The Traction or Continuous Tread Mountings are of improved design. Quick Acting Power Steering Devices, Horizontal Hoisting Engines, Vertical Submerged Tube Type Boilers, all help to get out the most work for the fewest dollars.

Crane, Clamshell or Dragline features can be embodied in their construction, or quickly applied in the field.

The OSGOOD Company

MARION, OHIO, U. S. A.

FACING CONCRETE WORK

Middlebury Terrazzo for the facing of all Concrete Products and Stucco Buildings gives the appearance of solid marble with a material saving in price.

This aggregate is made from Middlebury White and Creme Statuary Marbles, making a beautiful and everlasting face, giving the building a distinctive appearance, a richness of finish that can be obtained by no other facing.

This material is furnished, carefully graded to size, in either dust, No. 1, 2 or 3. Write for samples and prices

Middlebury Marble Company
BRANDON, VERMONT

EVER-GREEN and EVER-RED Slate Granules

Ever-Green and Ever-Red Slate Granules, used in making slate surfaced roofing, slate flour as a filler in paints, mechanical rubber goods, linoleum, window shades, plastic roofing, roofing cement, and asphalt roads, can be used with telling effect

For the Facing of Concrete Blocks, Bricks or Stucco

The beauty, style and finish of a building covered with this material adds appreciably to its value.

It can be delivered carefully graded to size.

Write for samples and prices
VERMONT MILLING PRODUCTS CORP.
POULTNEY, VERMONT

METRO NITE
for Stucco

Metro-Nite White is a siliceous dolomite, extremely hard, sharp, cleanly graded and makes a bright, sparkling face for stucco buildings, concrete bricks or blocks.

It is generally accepted as the most beautiful and artistic facing known for this purpose, and we will gladly send samples to anyone who is interested in carload lots.

Metro-Nite can be delivered either in white or green.

THE METRO-NITE CO.
333 Hartford Ave., Milwaukee, Wis.

DMC
Reg. U. S. Pat. Off.

Send it Safely—Ship in Steel

No. 12 Light Shipping Steel Barrel

Our No. 8 Catalogue Just Fits Your Pocket

Serving the Lime Field

For one year we have been offering the lime and cement field the services of the Draper Steel Barrel. Results have so far justified our efforts that we feel impelled to say to every producer that the advent of our steel barrel in this field has marked an epoch in the shipping of rock products.

If you are not using Draper Steel Barrel Service get in touch with our sales department

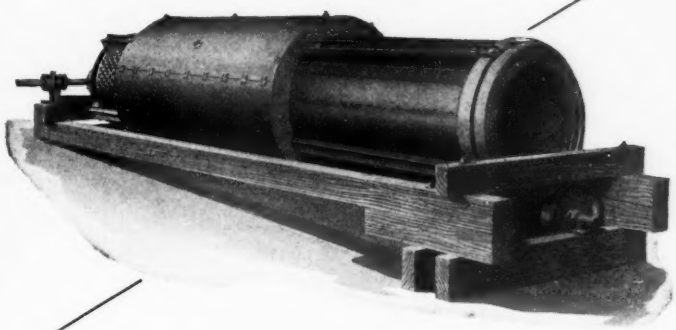
"What the Shipper Puts In the Customer Takes Out"

THE DRAPER MFG. CO.

8906 Crane Ave. **Cleveland, Ohio**

District Sales Offices:

New Orleans, La.—203 Pan-American Bldg.; E. J. Putzell, Dist. Sales Mgr.
New York—110 William St.; C. B. Peters Co., Inc., Eastern Sales Representative
Chicago, Ill.—128 N. Wells St.; Amco Sales Corporation.
San Francisco, Cal.—16 California St.; The Hale Co.

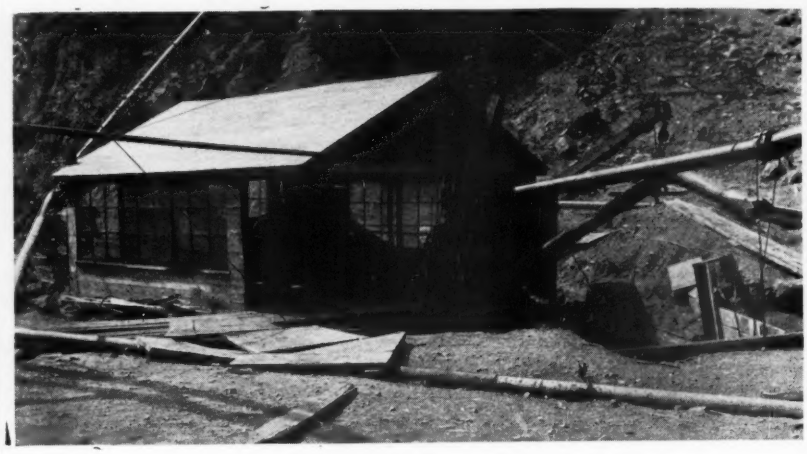


TELSMITH FOR CLEAN GRAVEL

The Telsmith Heavy Duty Gravel Washer has four important advantages:—(a) It not only washes, but sizes the product too. (b) It assures a clean product in any pit that is commercially workable. (c) It requires a minimum of space and head-room. (d) It saves its own price in the reduced cost of transmission machinery, conveyors and bins. If you are not familiar with the Telsmith Washer, let us tell you where you can see it work. Glad to send you references and our bulletin No. G-P-11.

SMITH ENGINEERING WORKS

3188 Locust Street **Milwaukee, Wisconsin**



AMSCO

PUMP

At the

AJAX
Sand & Gravel Company

The Ajax Sand and Gravel Co., Cleveland, Ohio, are using an 8-in. AMSCO, with results that have proven satisfactory to an unusual degree.

The AMSCO has a habit of delivering the goods—not only for the Ajax Sand and Gravel Co., but for hundreds of plants, located here and there, throughout the country. It delivers all the economy that continuous performance and durability can give.

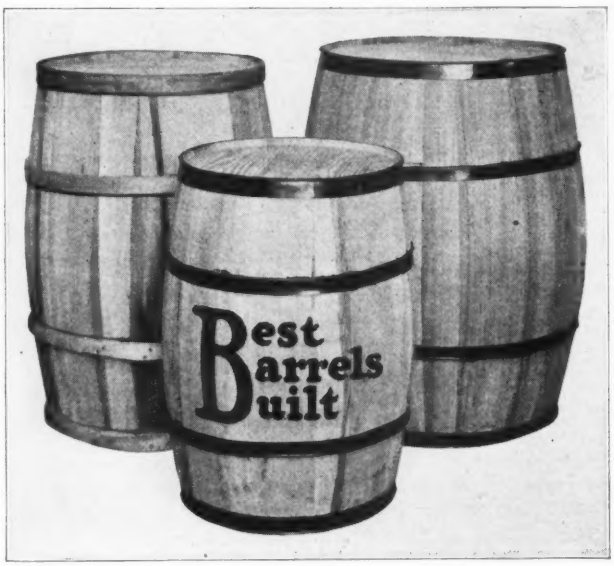
If you have a pumping problem, our engineering corps can help you solve it

American Manganese Steel Company

General Sales Offices, Chicago Heights, Ill.

Plants: Chicago Heights, Ill. New Castle, Delaware Oakland, California

The Wooden Barrel is Superior



THIS organization maintains for your convenience, fifty-one barrel plants and warehouses in all of the states east of the Mississippi River, and owns or controls the output of a large number of stave and heading mills located in the timber districts of the Southwest. Therefore we are prepared to deliver the "Best Barrels Built," made of tongued and grooved staves, glued heading, thoroughly Kiln dried, and bound with wood, wire or steel hoops to meet your requirements.

These barrels are practically indestructible, rat, vermin and moisture proof, and meet all the government and railroad requirements for the safe transportation of poisonous substances.

If you are in a hurry, we can supply you.

SANDUSKY COOPERAGE & LUMBER CO., Toledo, Ohio

Spotting Delays are Costly

Save the minutes—and dollars—you are losing at crusher, dump and weighing machine. Get your cars up and away without loss of time.

You can do it with a Shay Geared Locomotive. The Shay spots quicker than a rod engine, 11% quicker. It's more accurate, too. There's no jockeying back and forth with a Shay.

By replacing your unsuited rod engines with Shay Geared Locomotives you can eliminate lost time in spotting and help your entire equipment to greater output. May we tell you what Shays are doing in quarry and pit?

LIMA LOCOMOTIVE WORKS, Incorporated
17 East 42nd St., New York Lima, Ohio

WELLER-MADE EQUIPMENT

For Handling the Materials Mechanically

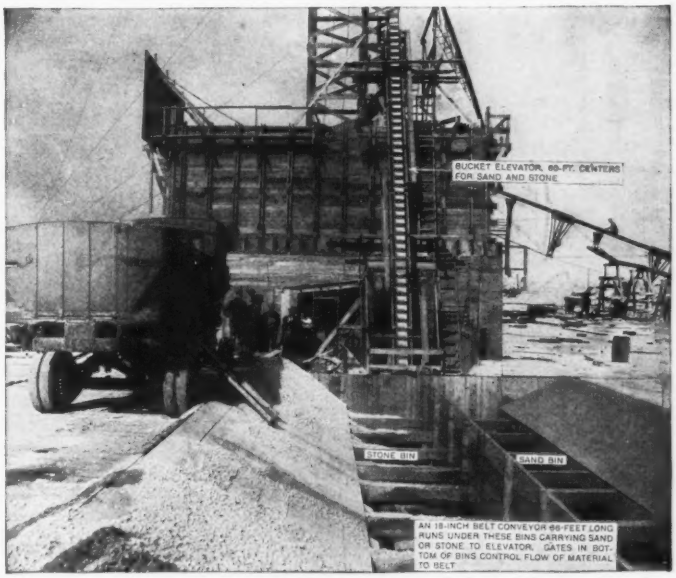
Increase the Output and Reduce Costs by Employing Weller-Made Machinery to Do the Work

It is sturdy and reliable. Never lays down on the job. The cost of operation is small. Will help pay dividends.

We Make
Conveyors of All Types

Bucket Elevators	Portable Elevators
Steel Storage Bins	Bin Gates
Screens	Sheet Metalwork, etc.

Write and let us know the kind of equipment you are interested in or the material you want to handle. Catalogues showing installations, also data to help in selection of equipment, will be sent.


BUCKET ELEVATOR, 60-FT. CENTERS FOR SAND AND STONE
STONE BIN
SAND BIN
AN 18-INCH BELT CONVEYOR 60 FEET LONG RUNS UNDER THESE BINS CARRYING SAND OR STONE TO ELEVATOR. GATES IN BOTTOM OF BINS CONTROL FLOW OF MATERIAL TO BELT

WELLER MFG. CO.

1820-1856 North Kostner Avenue **SALES OFFICES** **Chicago, Illinois**

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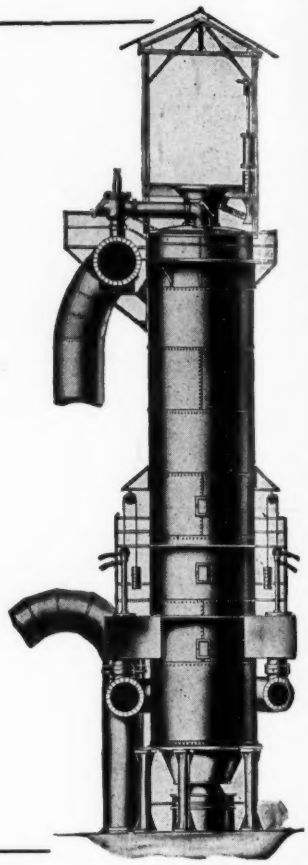
Continuous Discharge—Gas Fired

LIME KILNS

The wastefulness of efficiency of any lime burning apparatus is determined by the amount of fuel per ton of lime produced.

Our Kilns are not an experiment, but have successfully met the test of years of actual service. The design is the work of our Consulting Mechanical and Chemical Engineer, who has had many years of practical operative experience. They embody a number of labor saving devices, and are designed to secure maximum production with minimum fuel consumption; their record in this respect should interest every lime producer in the country.



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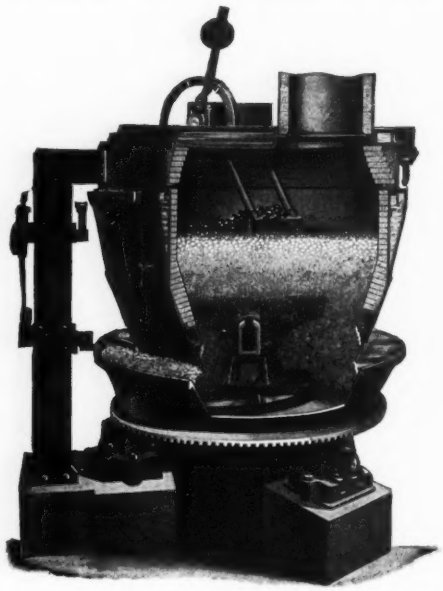

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Users everywhere testify with one voice to the superior satisfaction and low maintenance expense of this splendid machine. Difference in first cost comes back annually; every detail built for endurance.

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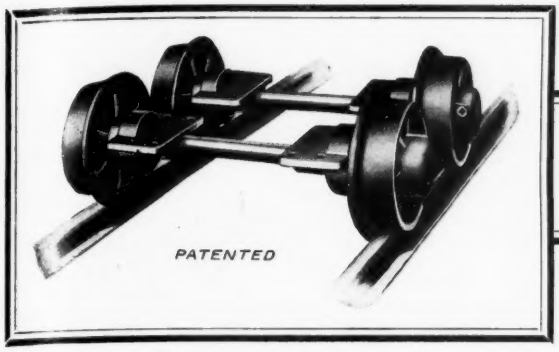

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offer the only logical solution to a difficult haulage problem. They are constructed with the idea of continuous service—with the idea of giving a performance unusual in efficiency and economy.

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The name OTTUMWA on a quarry car truck is your guarantee of long time service—of a real saving in oil and power.

Ottumwa Patent Roller Bearing Wheel Trucks are not only mechanically correct in design, and high grade in every particular, but are surprisingly low in first cost; and the operating costs offer a definite saving that will soon accumulate to the price of the product.

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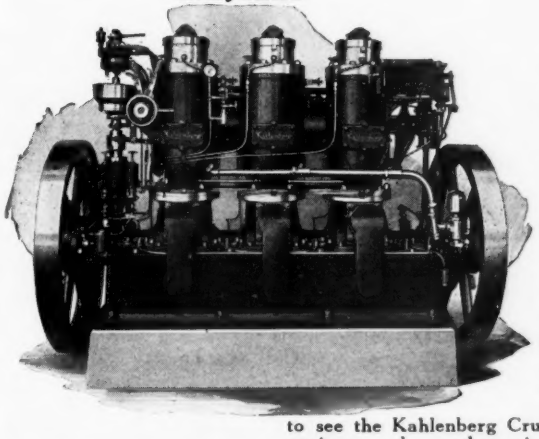

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HEAVY DUTY OIL ENGINES

Sizes 25 to 180 H.P.

News of the New Kahlenberg Crude Oil Engine has spread throughout the Stationary Engine Industry. It did not take long for alert men in every corner of the land to learn that a radical and original engine improvement has been brought forth. Men who have seen the new type Kahlenberg in action have told others—all have agreed that no other crude oil engine has embodied the original features **conceived** and **perfected** by Kahlenberg. For this reason, we want you also to see the Kahlenberg Crude Oil Engine, note its convenience and smoothness in action, when running at any speed, no load, or full load. Note particularly that it idles all day without skipping and takes up full load without shock or jar instantly, and without special devices of any kind—it is built that way.

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Patented—Governor control.
Patented—Injection control.
Patented—Air starting and reversing.
Patented—Water cooled combustion chamber.
Patented—Pressure fuel oil strainer.
Every part "getatable" and removable.
Guaranteed to operate perfectly on any of the crude fuel oils or kerosene.

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Manufacturers

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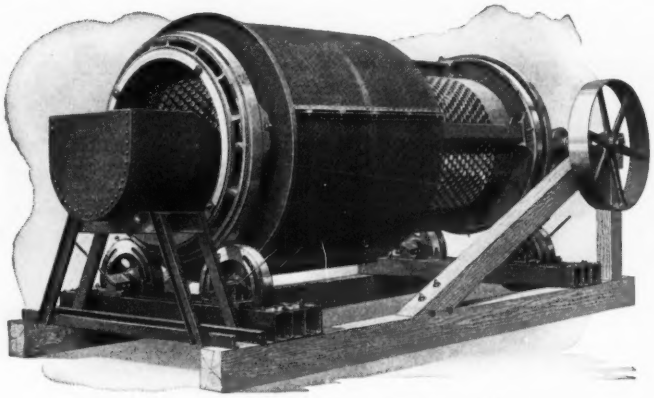

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To meet the requirements of modern rock crushing plant operators, Allis-Chalmers have designed and successfully installed their Style "B" Open End Revolving Screens.

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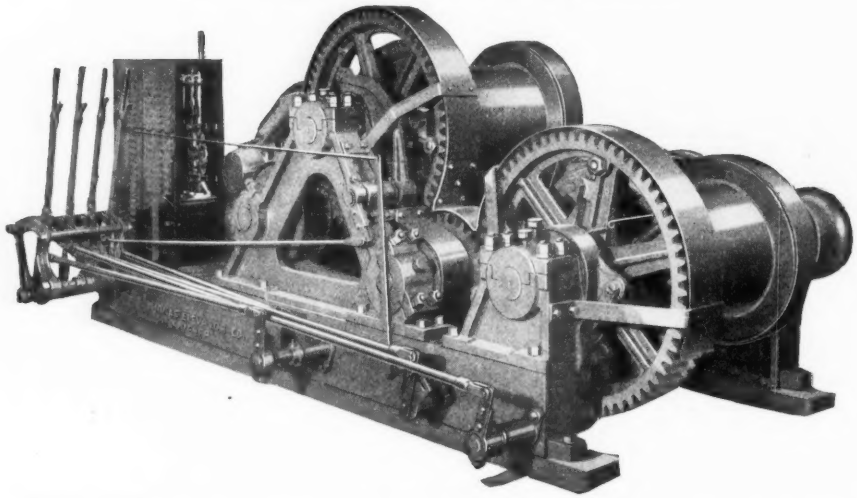
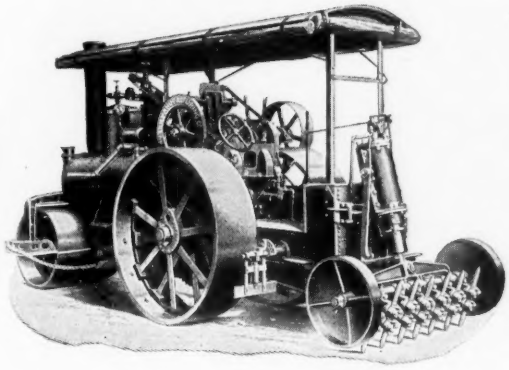
For Dragline Cableway Operation



THOMAS ELEVATOR COMPANY

27 South Hoyne Avenue **Chicago, Ill.**



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The Austin has all the good features common to steam rollers, and in addition has exclusive features of proven value which represent the greatest advance in steam roller construction in years, and add greatly to the operating efficiency of the roller besides saving money for its owner.

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The only single unit transmission.
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Larger transmission bearings.
Wider gear faces.

Austin Steam Rollers will measure up to your most exacting requirements, and then surprise you by how far they surpass them. These rollers are fully illustrated and described in Special Roller Catalog FT. Write for your copy today

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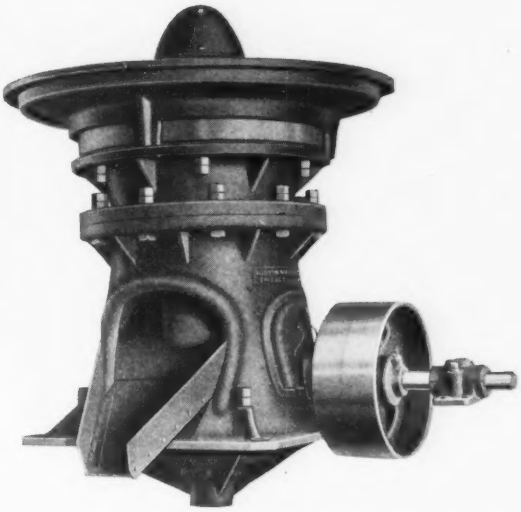
Chicago, Illinois
Branches in 22 Cities
"Everything from a Drag Scraper to a Road Roller"



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Austin equipment in your crushing plant will solve your most difficult production problems. Austin Crushers have features found in no others, while Austin Elevators, Screens, Cars and other accessories are in a class with the crushers.

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Schaffer Eng. & Equip. Co., Pitsburgh, Pa.

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Valve Bag Co. of America, Toledo, Ohio.

BALL MILLS
Hardinge Company, N. Y. City, N. Y.

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Sandusky Cooperage & Lbr. Co., Toledo, Ohio.

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New York Belting & Packing Co., New York, N. Y.

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Weller Mfg. Co., Chicago, Ill. (storage)

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Blaw-Knox Co., Pittsburgh, Pa.
Greenville Mfg. Co., Greenville, Ohio.
Link-Belt Co., Chicago, Ill.
Sturtevant Mill Co., Boston, Mass.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Webster Mfg. Co., The, Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

BLASTING SUPPLIES
Atlas Powder Co., Wilmington, Del.

BUCKETS—Elevator
Greenville Mfg. Co., Greenville, Ohio.
Haiss Mg. Co., Inc., The Geo., New York City, N. Y.
Hendrick Mfg. Co., Carbondale, Pa.
Link-Belt Co., Chicago, Ill.
Orton & Steinbrenner, Chicago, Ill.
Webster Mfg. Co., The, Chicago, Ill.

BUCKETS
Haiss Mg. Co., Inc., The Geo., New York City, N. Y.
McMyler Interstate Co., Cleveland, Ohio.

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S. Flory Mfg. Co., Bangor, Pa.
Interstate Equip. Co., New York, N. Y.
Link-Belt Co., Chicago, Ill.

CALCINING MACHINERY
Ehrsam & Sons Co., J. B., Enterprise, Kans.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.

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Kilbourne & Jacobs Mfg. Co., Columbus, Ohio.
Ottumwa Iron Wks., Ottumwa, Iowa.
Watt Mining Car Wheel Co., Barnesville, Ohio.

CAR PULLERS
Link-Belt Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

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Greenville Mfg. Co., Greenville, Ohio.
Haiss Mg. Co., Inc., The Geo., New York City, N. Y.
Link-Belt Co., Chicago, Ill.
Smith Eng. Works, Milwaukee, Wis.
Robins Conveying Belt Co., New York City.
Sturtevant Mill Co., Boston, Mass.
W. Toepfer & Sons Co., Milwaukee, Wis.
Universal Road Mach. Co., Kingston, N. Y.
Webster Mfg. Co., The, Chicago, Ill.

CRANES—Locomotive, Gantry
Byers Mach. Co., The, Ravenna, Ohio.
Erie Steam Shovel Co., Erie, Pa.
Link-Belt Co., Chicago, Ill.
McMyler-Interstate Co., Cleveland, Ohio.
Ohio Locomotive Crane Co., Bucyrus, Ohio.
Orton & Steinbrenner, Chicago, Ill.
Osgood Co., The, Marion, Ohio.

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Austin Mfg. Co., Chicago, Ill.
Bacon, Earle C., Inc., New York, N. Y.
Buchanan Co, Inc., C. G., New York, N. Y.
Gruendler Pat. Crusher & Pulv. Co., St. Louis, Mo.
Hardinge Company, N. Y. City, N. Y.
K. B. Pulverizer Co., New York, N. Y.
Lewistown Fdry. & Mach. Co., Lewistown, Pa.
McLanahan-Stone Mach. Co., Hollidaysburg, Pa.
Pennsylvania Crusher Co., Philadelphia, Pa.
Raymond Bros. Impact Pulv. Co., Chicago, Ill.
Smidth & Co., F. L., New York, N. Y.
Smith Eng Works, Milwaukee, Wis.
Sturtevant Mill Co., Boston, Mass.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Universal Crusher Co., Cedar Rapids, Iowa.
Universal Road Mach. Co., Kingston, N. Y.

CRUSHER REPAIRS—Manganese Steel
American Manganese Steel Co., Chicago Heights, Ill.

CLUTCHES
Link-Belt Co., Chicago, Ill.
Webster Mfg. Co., The, Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

DERRICKS
American Hoist & Derrick Co., St. Paul, Minn.

DIPPER TEETH
American Manganese Steel Co., Chicago Heights, Ill.

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S. Flory Mfg. Co., Bangor, Pa.

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Sanderson Cyclone Drill Co., Orrville, Ohio.

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ENGINES—Oil
Kahlenberg Bros. Co., Two Rivers, Wis.

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Crow, Waller, Inc., Chicago, Ill.
Ehrsam & Sons Co., J. B., Enterprise, Kans.
R. W. Hunt & Co., Chicago, Ill.
Smidth & Co., F. L., New York, N. Y.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.
Webster Mfg. Co., The, Chicago, Ill.

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Erie Steam Shovel Co., Erie, Pa.

EXCAVATORS—Dragline Cableway
Link-Belt Co., Chicago, Ill.
Sauerman Bros., Chicago, Ill.

EXPLOSIVES
Atlas Powder Co., Wilmington, Del.

FUSES
Ensign-Bickford Co., Simsbury, Conn.

GAS PRODUCERS
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Caldwell, H. W., & Son Co., Chicago, Ill.
Cleveland Worm & Gear Co., Cleveland, Ohio.
Link-Belt Co., Chicago, Ill.

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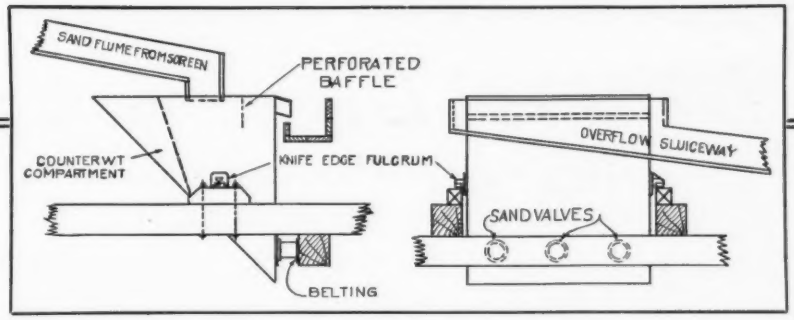

"Our Experience Costs You Nothing"

"The most sensitive, therefore the most successful"

Sand Settling Tanks

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We Manufacture
Bin Gates
Automatic Feeders
All types of Screens
Transmission Machinery
Complete Belt Conveyors
Complete Bucket Elevators
Automatic Sand Settling Tanks

The simplicity in design of our Steel Automatic Sand Settling Tanks accounts for their extreme sensitiveness, and therefore their universal success.

We have been making these tanks in accordance with our present design for several years, and as we have yet to receive the first complaint from any standpoint, or any customer, we are satisfied this device is unequalled in its class for efficiency and service, besides being inexpensive in first cost.

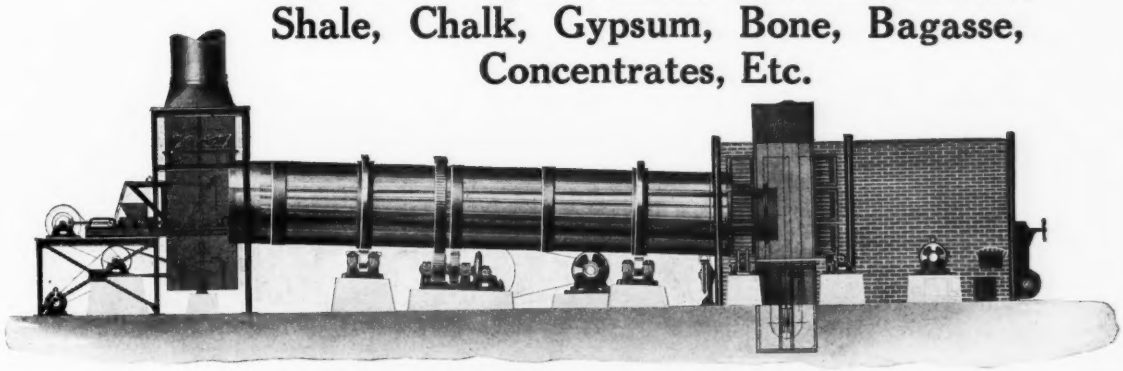
It is delivered you complete with knife-edge fulcrums, fulcrum bearings, over-flow spout and sand valves

The Greenville Mfg. Co.

"Specialists in Sand and Gravel Plant Equipment"
GREENVILLE, OHIO

VULCAN DRIER

For Coal, Lignite, Peat, Ore, Clay, Marl, Shale, Chalk, Gypsum, Bone, Bagasse, Concentrates, Etc.



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Flory Mfg. Co., S., Bangor, Pa.
J. S. Mundy Hoisting Engine Co., Newark, N. J.
Link-Belt Co., Chicago, Ill.
Ottumwa Iron Works, Ottumwa, Iowa.
Thomas Elevator Co., Chicago, Ill.
Vulcan Iron Works, Wilkes-Barre, Pa.
Weller Mfg. Co., Chicago, Ill.

HOSE—Water, Steam, Air Drill, Pneumatic Tool
N. Y. Belting & Packing Co., New York, N. Y.

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Miscampbell, H., Duluth, Minn.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.
W. Toepfer & Sons Co., Milwaukee, Wis.

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Morris Machine Works, Baldwinsville, N. Y.

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Webster Mfg. Co., The, Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

LIME KILNS
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Steacy-Schmidt Mfg. Co., York, Pa.
Vulcan Iron Works, Wilkes-Barre, Pa.

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Erie Steam Shovel Co., Erie, Pa.
Haiss Mg. Co., Inc., The Geo., New York City, N. Y.
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Orton & Steinbrenner, Chicago, Ill.

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Fate-Root-Heath Co., Plymouth, Ohio.
Hadfield-Penfield Steel Co., Bucyrus, Ohio.
Lima Locomotive Works, New York, N. Y.
Vulcan Iron Works, Wilkes-Barre, Pa.
Whitcomb Co., Geo. D., Rochelle, Ill.

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MOTOR TRUCKS
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Hendrick Mfg. Co., Carbondale, Pa.

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Link-Belt Co., Chicago, Ill.

POWDER
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Link-Belt Co., Chicago, Ill.
Webster Mfg. Co., The, Chicago, Ill.

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Morris Machine Works, Baldwinsville, N. Y.
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Weller Mfg. Co., Chicago, Ill.

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Williamsport Wire Rope Co., Williamsport, Pa.

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Traylor Eng. & Mfg. Co., Allentown, Pa.
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Universal Road Mach. Co., Kingston, N. Y.
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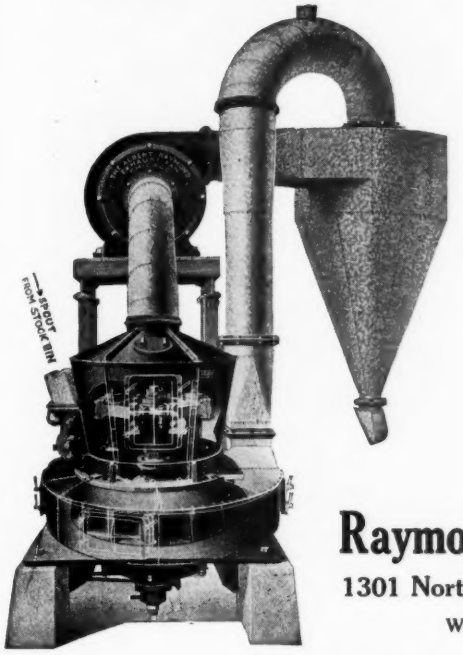
Cheaper Powdered Coal



Cement Plants that are looking to lower their costs in the Coal House and increase production on their Kilns will find Raymond Roller Mills the solution of their problem.

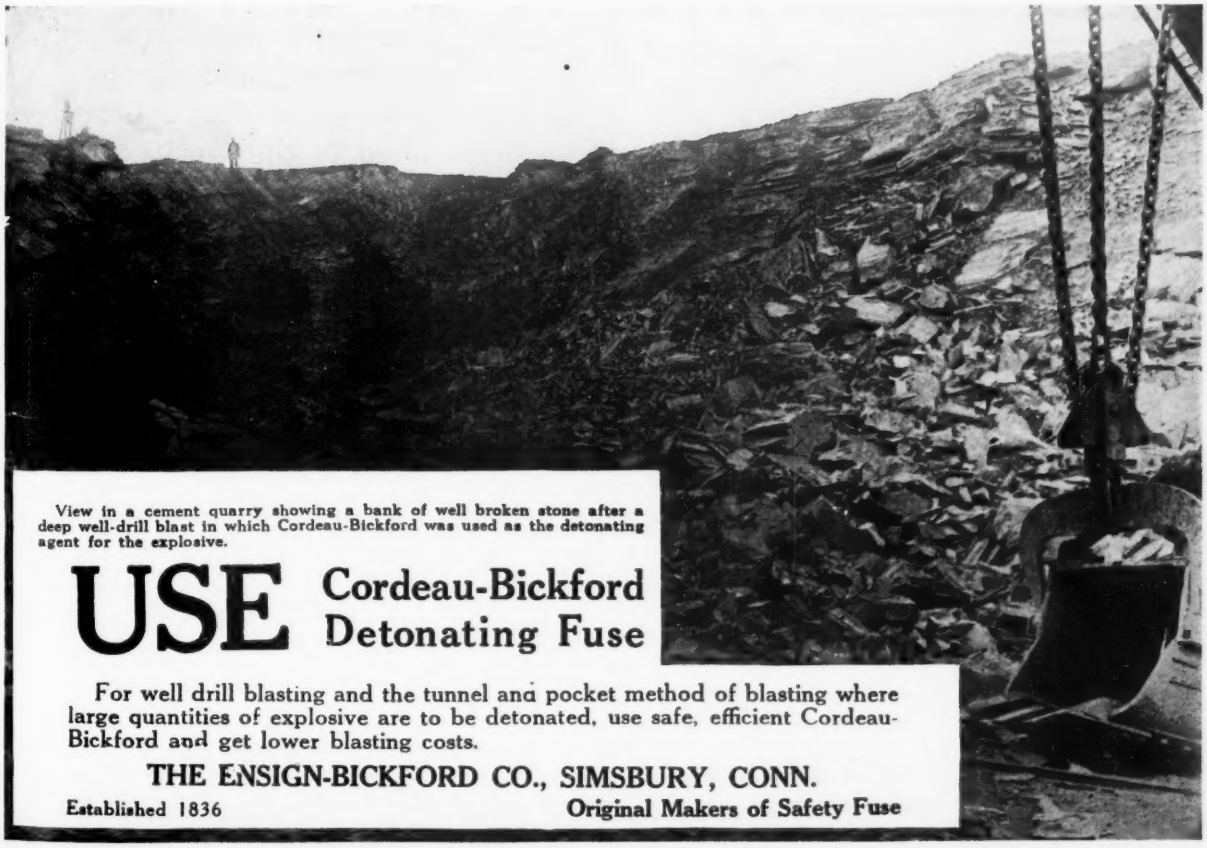
One plant formerly operating 20 Kilns is now getting the same production from 19 with the use of Raymond Mill Coal.

Why not get full details on your problem today?

Raymond Bros. Impact Pulverizer Company

1301 North Branch Street **Chicago, Ill.**

Western Office: 1002 Washington Bldg., Los Angeles, Calif.
Eastern Office: 50 Church St., New York City



View in a cement quarry showing a bank of well broken stone after a deep well-drill blast in which Cordeau-Bickford was used as the detonating agent for the explosive.

USE Cordeau-Bickford Detonating Fuse

For well drill blasting and the tunnel and pocket method of blasting where large quantities of explosive are to be detonated, use safe, efficient Cordeau-Bickford and get lower blasting costs.

THE ENSIGN-BICKFORD CO., SIMSBURY, CONN.

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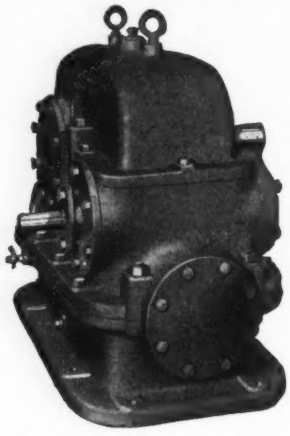

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